

# University of Connecticut Graduate Catalog 2018-2019

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The University of Connecticut reserves the right to revise, amend, or change items set forth in the *Graduate Catalog*. Accordingly, readers of the *Graduate Catalog* should inquire as to whether any revisions, amendments, or changes have been made since the date of publication. The University of Connecticut reserves the right to alter or cancel course offerings. Students must satisfy all requirements of their department, school or college, and the University of Connecticut whether or not they are listed in the *Graduate Catalog*.

### University Accreditation

The University of Connecticut is accredited by the New England Association of Schools and Colleges.

### Non-Discrimination Policy

The University of Connecticut complies with all applicable federal and state laws regarding non-discrimination, equal opportunity and affirmative action, including the provision of reasonable accommodations for persons with disabilities. UConn does not discriminate on the basis of race, color, ethnicity, religious creed, age, sex, marital status, national origin, ancestry, sexual orientation, genetic information, physical or mental disability, veteran status, prior conviction of a crime, workplace hazards to reproductive systems, gender identity or expression, or political beliefs in its programs and activities. Employees, students, visitors, and applicants with disabilities may request reasonable accommodations to address limitations resulting from a disability. For questions or more information, please contact the Associate Vice President, Office of Institutional Equity, 241 Glenbrook Road, Unit 4175, Storrs, CT 06269-4175; Phone: (860) 486-2943; Email: [equity@uconn.edu](mailto:equity@uconn.edu); Website: [equity.uconn.edu](http://equity.uconn.edu).

# Academic Calendar

Summer Session 2018 ([summersession.uconn.edu](http://summersession.uconn.edu))

## Fall Semester 2018

Mon. Aug. 27	Fall semester begins
Mon. Sept. 3	Labor Day – No classes
Mon. Sept. 10	Last day to add or drop courses via the Student Administration System without additional signatures (See chart under Adding and Dropping Courses). Courses dropped after this date will have a “W” for withdrawal recorded on the academic record.
Tues. Sept. 25	Dean’s signature required to add courses
Mon. Oct. 22	Registration for the Spring 2019 semester via Student Administration System begins
Mon. Oct. 29	Last day to withdraw from a course without advisor’s written recommendation and dean’s approval
Fri. Nov. 16	Last day to announce an oral defense of a doctoral dissertation for conferral of a Fall 2018 degree
Sun.-Sat., Nov. 18-24	Thanksgiving Recess
Fri. Nov. 30	Last day to defend a master’s thesis or doctoral dissertation for conferral of a Fall 2018 degree
	Last day to submit thesis and dissertation final copies to Digital Commons and related paperwork to Degree Audit in the Office of the Registrar for conferral of a Fall 2018 degree
Fri. Dec. 7	Last day of fall semester classes
Mon.-Sun., Dec. 10-16	Final examinations

Winter Session 2019 ([wintersession.uconn.edu](http://wintersession.uconn.edu))

## Spring Semester 2019

Tues. Jan. 22	Spring semester begins
Mon. Feb. 4	Last day to add or drop courses via the Student Administration System without additional signatures (See chart under Adding and Dropping Courses). Courses dropped after this date will have a “W” for withdrawal recorded on the academic record.
Tues. Feb. 19	Dean’s signature required to add courses
Sun.-Sat., Mar. 17-23	Spring Recess
Mon. Mar. 25	Registration for the Fall 2019 semester via Student Administration System begins
Sat. Mar. 30	Emergency closing class makeup date
Mon. Apr. 1	Last day to withdraw from a course without advisor’s written recommendation and dean’s approval
Fri. Apr. 12	Last day to announce an oral defense of a doctoral dissertation for conferral of a Spring 2019 degree
Fri. Apr. 26	Last day to defend a master’s thesis or doctoral dissertation for conferral of a Spring 2019 degree
	Last day to submit thesis and dissertation final copies to Digital Commons and related paperwork to Degree Audit in the Office of the Registrar for conferral of a Spring 2019 degree
Fri. May 3	Last day of spring semester classes
Mon.-Sat., May 6-11	Final examinations
Sat., May 11	Graduate School Masters commencement ceremony
Mon., May 13	Graduate School Doctoral commencement ceremony

# Fields of Study and Concentrations

The Graduate School oversees all graduate programs, including all graduate degree, certificate, sixth-year diploma and post-baccalaureate programs, excluding the Doctor of Pharmacy and degrees granted by the School of Dental Medicine, School of Law, and School of Medicine.

## Degrees

- Doctor of Audiology
- Doctor of Physical Therapy
- Doctor of Education
- Doctor of Musical Arts
- Doctor of Nursing Practice
- Doctor of Philosophy
- Master of Arts
- Master of Business Administration
- Master of Dental Science
- Master of Engineering
- Master of Fine Arts
- Master of Music
- Master of Public Administration
- Master of Public Health
- Master of Public Policy
- Master of Science
- Master of Social Work

### College of Agriculture, Health and Natural Resources

- Agricultural and Resource Economics..... Ph.D.
- Animal Science..... M.S., Ph.D.
  - Animal Genetics and Regenerative Biology (Ph.D.)
  - Animal Nutrition (Ph.D.)
  - Food Microbiology and Safety (Ph.D.)
  - Growth and Reproductive Physiology (Ph.D.)
- Applied and Resource Economics.....M.S.
- Athletic Training .....M.S.
- Energy and Environmental Management .....M.S.
- Genetic Counseling .....M.S.
- Health Care Genetics.....M.S.
- Health Promotion Sciences..... M.S., Ph.D.
- Kinesiology .....M.S., Ph.D.
  - Exercise Science (M.S., Ph.D.)
- Materials Science.....M.S., Ph.D.
- Natural Resources: Land, Water, and Air.....M.S., Ph.D.
- Nutritional Science .....M.S., Ph.D.
- Pathobiology .....M.S., Ph.D.
  - Bacteriology (M.S., Ph.D.)
  - Pathology (M.S., Ph.D.)
  - Veterinary Anatomic Pathology (M.S.)
  - Virology (M.S., Ph.D.)
- Physical Therapy .....D.P.T.
- Plant Science.....M.S., Ph.D.
  - Agromony (M.S., Ph.D.)
  - Horticulture (M.S., Ph.D.)

- Landscape Architecture (M.S.)
- Plant Breeding (M.S., Ph.D.)
- Plant Environment (M.S., Ph.D.)
- Soil Chemistry (M.S., Ph.D.)
- Soil Science (M.S., Ph.D.)

- Polymer Science .....M.S., Ph.D.
- Systems Genomics ..... Ph.D.

### School of Business

- Accounting .....M.S.
- Business Administration.....M.B.A., Ph.D.
  - Accounting (Ph.D.)
  - Business Analytics (M.B.A.)
  - Digital Marketing Strategy (M.B.A.)
  - Executive M.B.A.
  - Finance (M.B.A., Ph.D.)
  - Financial Analysis and Investment (M.B.A.)
  - General Business (M.B.A.)
  - Health Care Management (M.B.A.)
  - International Business (M.B.A.)
  - Management (M.B.A., Ph.D.)
  - Marketing (Ph.D.)
  - Operations and Information Management (Ph.D.)
  - Real Estate (M.B.A.)
- Business Analytics and Project Management .....M.S.
- Financial Risk Management .....M.S.
  - Quantitative Risk Management
- Human Resource Management .....M.S.

### School of Engineering

- Advanced Manufacturing for Energy Systems .....M.S.
  - Advanced Materials
  - Processing
  - Systems and Controls
- Biomedical Engineering..... M.S., Ph.D.
- Chemical Engineering .....M.S., Ph.D.
- Civil Engineering.....M.S., Ph.D.
  - Applied Mechanics (Ph.D.)
  - Environmental Engineering (M.S.)
  - Geotechnical Engineering (M.S., Ph.D.)
  - Structural Engineering (M.S., Ph.D.)
  - Transportation and Urban Engineering (M.S., Ph.D.)
- Computer Science and Engineering .....M.S., Ph.D.
- Electrical Engineering .....M.S., Ph.D.
  - Electronics, Photonics, and Biophotonics (M.S., Ph.D.)
  - Information, Communication, Decision, and Biosystems (M.S., Ph.D.)
- Engineering ..... M.Eng.
  - Advanced Systems Engineering
  - Civil and Environmental Engineering
  - Clinical Engineering
  - Contaminated Site Remediation
  - Electrical and Computer Engineering
  - General Engineering
  - Materials Science and Engineering
  - Mechanical Engineering
- Environmental Engineering .....M.S., Ph.D.
- Materials Science.....M.S., Ph.D.
- Materials Science and Engineering .....M.S., Ph.D.
- Mechanical Engineering .....M.S., Ph.D.
  - Systems and Mechanics (M.S., Ph.D.)
  - Thermal and Fluid Sciences (M.S., Ph.D.)
- Polymer Science .....M.S., Ph.D.

**School of Fine Arts**

Art.....	M.F.A.
Arts Administration .....	M.F.A.
Digital Media and Design .....	M.A., M.F.A.
Dramatic Arts.....	M.A., M.F.A.
Acting (M.A., M.F.A.)	
Design (M.F.A.)	
Directing (M.F.A.)	
Puppetry (M.A., M.F.A.)	
Technical Direction (M.F.A.)	
Theatre History and Criticism (M.A.)	
Music.....	M.A., M.Mus., D.M.A., Ph.D.
Conducting (D.M.A., M.Mus.)	
Historical Musicology (M.A.)	
Music Theory and History (Ph.D.)	
Performance (D.M.A., M.Mus.)	
Music Theory (M.A.)	

**College of Liberal Arts and Sciences**

Anthropology.....	M.A., Ph.D.
Applied Biochemistry and Cell Biology.....	M.S.
Applied Financial Mathematics.....	M.S.
Actuarial Science (M.S.)	
Applied Genomics.....	M.S.
Applied Microbial Systems Analysis.....	M.S.
Biodiversity and Conservation Biology.....	M.S.
Biostatistics .....	M.S.
Chemistry.....	M.S., Ph.D.
Communication .....	M.A., Ph.D.
Ecology and Evolutionary Biology.....	M.S., Ph.D.
Economics.....	M.A., Ph.D.
Energy and Environmental Management .....	M.S.
English.....	M.A., Ph.D.
Genetic Counseling .....	M.S.
Geography.....	M.A., Ph.D.
Geological Sciences.....	M.S., Ph.D.
Geology (M.S., Ph.D.)	
Geophysics (M.S., Ph.D.)	
History.....	M.A., Ph.D.
Human Development and Family Studies.....	M.A., Ph.D.
Judaic Studies.....	M.A.
Linguistics.....	M.A., Ph.D.
Literatures, Cultures, and Languages .....	M.A., Ph.D.
Applied Linguistics and Discourse Studies (M.A., Ph.D.)	
Comparative Literary and Cultural Studies (M.A., Ph.D.)	
French and Francophone Studies (M.A., Ph.D.)	
German Studies (M.A., Ph.D.)	
Hebrew and Judaic Studies (M.A., Ph.D.)	
Italian Literary and Cultural Studies (M.A., Ph.D.)	
Spanish Studies (M.A., Ph.D.)	
Materials Science.....	M.S., Ph.D.
Mathematics.....	M.S., Ph.D.
Actuarial Science (M.S.)	
Medieval Studies .....	M.A., Ph.D.
Molecular and Cell Biology.....	M.S., Ph.D.
Cell and Developmental Biology (M.S., Ph.D.)	
Genetics and Genomics (M.S., Ph.D.)	
Microbiology (M.S., Ph.D.)	
Structural Biology, Biochemistry and Biophysics (M.S., Ph.D.)	
Oceanography.....	M.S., Ph.D.

Philosophy.....	M.A., Ph.D.
Physics.....	M.S., Ph.D.
Physiology and Neurobiology .....	M.S., Ph.D.
Political Science.....	M.A., Ph.D.
Polymer Science .....	M.S., Ph.D.
Psychological Sciences .....	M.S., Ph.D.
Behavioral Neuroscience (M.S., Ph.D.)	
Clinical Psychology (M.S., Ph.D.)	
Developmental Psychology (M.S., Ph.D.)	
Ecological Psychology (M.S., Ph.D.)	
Industrial and Organizational Psychology (M.S., Ph.D.)	
Language and Cognition (M.S., Ph.D.)	
Neurosciences (M.S., Ph.D.)	
Social Psychology (M.S., Ph.D.)	
Public Administration.....	M.P.A.
Public Policy .....	M.P.P.
Quantitative Economics .....	M.S.
Sociology.....	M.A., Ph.D.
Speech, Language, and Hearing Sciences .....	M.A., Ph.D., Au.D.
Statistics.....	M.S., Ph.D.
Survey Research.....	M.A.
Systems Genomics .....	Ph.D.

**Neag School of Education**

Curriculum and Instruction .....	(M.A., Ph.D.)
Bilingual and Bicultural Education (M.A., Ph.D.)	
Elementary Education (M.A., Ph.D.)	
Music Education (M.A.)	
Reading and Language Arts Consultant (M.A.)	
Reading Education (M.A., Ph.D.)	
Remedial Reading and Language Teacher (M.A.)	
Secondary Education: Agricultural Education (M.A.)	
Secondary Education: English Education (M.A., Ph.D.)	
Secondary Education: History and Social Studies Education (M.A., Ph.D.)	
Secondary Education: Mathematics Education (M.A., Ph.D.)	
Secondary Education: Science Education (M.A., Ph.D.)	
Secondary Education: World Language Education (M.A., Ph.D.)	
Educational Leadership.....	Ed.D.
Educational Psychology.....	M.A., Ph.D.
Cognition, Instruction, and Learning Technology (M.A., Ph.D.)	
Counselor Education and Counseling Psychology (M.A., Ph.D.)	
Educational Technology (M.A.)	
Giftedness, Creativity and Talent Development (M.A., Ph.D.)	
Research Methods, Measurement, and Evaluation (M.A., Ph.D.)	
School Psychology (M.A., Ph.D.)	
Special Education (M.A., Ph.D.)	
Higher Education Student Affairs.....	M.A.
Learning, Leadership, and Education Policy.....	Ph.D.
Adult Learning	
Leadership and Policy	
Sport Management	
Sport Management .....	M.S.

**Office of Global Affairs**

International Studies.....	M.A.
Latino and Latin American Studies	

**UConn Health**

Biomedical Science .....	M.S., Ph.D.
Cell Analysis and Modeling (M.S., Ph.D.)	
Cell Biology (M.S., Ph.D.)	

Genetics and Developmental Biology (M.S., Ph.D.)  
 Immunology (M.S., Ph.D.)  
 Molecular Biology and Biochemistry (M.S., Ph.D.)  
 Neuroscience (M.S., Ph.D.)  
 Skeletal Biology and Regeneration (M.S., Ph.D.)

Clinical and Translational Research .....M.S.  
 Dental Science .....M.Dent.Sc.  
 Genetic Counseling .....M.S.  
 Materials Science..... M.S., Ph.D.  
 Polymer Science ..... M.S., Ph.D.  
 Public Health.....M.P.H., Ph.D.  
 Systems Genomics ..... Ph.D.

**School of Nursing**

Nursing .....D.N.P., M.S., Ph.D.  
 Adult-Gerontology Acute Care Nurse Practitioner (D.N.P., M.S.)  
 Adult-Gerontology Primary Care Nurse Practitioner (D.N.P., M.S.)  
 Family Nurse Practitioner (D.N.P., M.S.)  
 Neonatal Nurse Practitioner (D.N.P., M.S.)

**School of Pharmacy**

Materials Science.....M.S., Ph.D.  
 Pharmaceutical Sciences ..... M.S., Ph.D.  
 Medicinal Chemistry (M.S., Ph.D.)  
 Pharmaceutics (M.S., Ph.D.)  
 Pharmacology and Toxicology (M.S., Ph.D.)  
 Polymer Science ..... M.S., Ph.D.

**School of Social Work**

Social Work ..... M.S.W., Ph.D.  
 Community Organizing (M.S.W.)  
 Individuals, Groups, and Families (M.S.W.)  
 Policy Practice (M.S.W.)

**Sixth-Year Diploma in Professional Education**

Bilingual and Bicultural Education  
 Cognition, Instruction and Learning Technology  
 Counseling  
 Educational Administration  
 Educational Technology  
 Elementary Education  
 Giftedness, Creativity and Talent Development  
 Reading and Language Arts Consultant  
 Reading Education  
 Remedial Reading and Language Teacher  
 School Psychology  
 Secondary Education: English Education  
 Secondary Education: History and Social Studies Education  
 Secondary Education: Mathematics Education  
 Secondary Education: Science Education  
 Secondary Education: World Language Education  
 Special Education

**Certificates**

Post-Baccalaureate Certificate (PB)  
 Graduate Certificate

**College of Agriculture, Health and Natural Resources**

Diagnostic Genetic Sciences (PB)  
 Cytogenetics  
 Molecular Diagnostic Genetics  
 Exercise Prescription  
 Health Promotion and Health Education  
 Medical Laboratory Sciences (PB)  
 Occupational Safety and Health (PB)  
 Sustainable Environmental Planning and Management

**School of Business**

Accounting Fundamentals  
 Advanced Business Certificate in Accounting Analytics  
 Advanced Business Certificate in Business Analytics  
 Advanced Business Certificate in Digital Marketing Strategy  
 Advanced Business Certificate in Health Care Analytics  
 Advanced Business Certificate in Health Care Finance and Insurance  
 Advanced Business Certificate in Human Resource Management  
 Advanced Business Certificate in Information Technology Audit  
 Advanced Business Certificate in Project Management  
 Corporate and Regulatory Compliance  
 Global Risk Management  
 Long-Term Health Care Management

**School of Engineering**

Advanced Systems Engineering  
 Composites  
 Contaminated Site Remediation  
 Power Engineering

**Enrichment Programs**

Medicine and Dental Medicine (PB)

**School of Fine Arts**

Arts Administration  
 Digital Media and Design  
 Music Performance  
 Puppet Arts

**UConn Health**

Addiction Sciences  
 Biomedical Science Research Experience  
 Clinical and Translational Research  
 Disability Studies in Public Health  
 Foundations of Public Health  
 Health Psychology  
 Social Determinants of Health and Disparities

**College of Liberal Arts and Sciences**

American Studies  
 Cognitive Science  
 Culture, Health and Human Development  
 Digital Humanities and Media Studies  
 Feminist Studies  
 Geographic Information Systems  
 Health Psychology  
 Human Rights  
 Intraoperative Neuromonitoring  
 Leadership and Public Management  
 Logic  
 Neurobiology of Language  
 Nonprofit Management  
 Occupational Health Psychology  
 Public Financial Management  
 Quantitative Research Methods  
 Race, Ethnicity, and Politics  
 Survey Research

**Neag School of Education**

College Instruction  
 Executive Leadership  
 Gifted Education and Talent Development  
 Human Rights  
 Leadership and Diversity in Sport Management  
 Literacy Supports  
 Postsecondary Disability Services  
 Program Evaluation  
 School Law  
 School-wide Positive Behavior Support  
 Special Education Transition to Adulthood

**School of Nursing**

Health Professions Education  
 Holistic Nursing  
 Nursing Practice  
   Adult Gerontology Acute Care Nurse Practitioner  
   Adult Gerontology Primary Care Nurse Practitioner  
   Neonatal Nurse Practitioner  
 Pain Management

**School of Social Work**

Human Rights

**Dual Degree Programs**

D.M.D./Ph.D. (Biomedical Science)  
 M.B.A./J.D.  
 M.B.A./M.A. (International Studies)  
 M.B.A./M.Eng.  
 M.B.A./MIM (ESC Lyon, France)  
 M.B.A./M.S. (Business Analytics and Project Management)  
 M.B.A./M.S. (Financial Risk Management)  
 M.B.A./M.S. (Human Resource Management)  
 M.B.A./M.S. (Nursing)  
 M.B.A./M.S.W.  
 M.B.A./Pharm.D.  
 M.B.A./Ph.D. (Biomedical Science)  
 M.D./M.B.A.  
 M.D./M.S. (Clinical and Translational Research)  
 M.D./Ph.D. (Biomedical Science)  
 M.P.H./D.M.D.  
 M.P.H./J.D.  
 M.P.H./M.D.  
 M.P.H./M.S.W.  
 M.P.H./PharmD.  
 M.S.W./J.D.

# Admission

The Graduate School processes applications for all graduate programs, including all graduate degree, certificate, sixth-year diploma, and post-baccalaureate programs, with the exception of the Master of Business Administration (MBA) program and programs at the School of Dental Medicine, School of Law, and School of Medicine. Students who meet requirements outlined below may apply to any of the “Graduate Degree and Certificate Programs” listed in the previous section by going to [grad.uconn.edu/admissions](http://grad.uconn.edu/admissions). Students may earn a graduate degree or certificate only in a program to which they have been admitted.

## Graduate Degree Programs

Ordinarily, a student is granted admission to pursue a graduate degree in one field at a time. A student may be permitted to enroll concurrently in two different degree programs with approval of their advisors in both programs. There are several approved dual degree programs providing the opportunity for the student to pursue work toward two degrees simultaneously. These programs often involve the sharing of a limited and specified number of course credits between the two degrees. In all cases, separate applications must be filed for each of the two degree programs.

To be admitted to regular status and to begin studies, an applicant must hold a baccalaureate from a regionally accredited college or university or present evidence of the equivalent. The applicant must submit official transcripts covering all previous work, undergraduate and graduate, which must be of at least the following quality: a cumulative grade point average of 3.0 for the entire undergraduate record, or 3.0 for the last two years of full-time coursework, or 3.5 GPA or higher in the entire final year of coursework prior to application to the Graduate School. The grade point average is computed on the following scale: “A” = 4.0, “B” = 3.0, “C” = 2.0, “D” = 1.0, “F” = 0. Applicants from international colleges and universities must meet equivalent standards of eligibility and are expected to submit official transcripts showing all work completed. All advanced post-baccalaureate coursework is considered as well. Failure to send transcripts from all educational institutions, regardless of whether or not a degree was received, may be grounds for cancellation of admission.

In addition to the above requirements, individual programs typically have additional requirements and specify what must be submitted at the time of application. Applicants to most programs are encouraged to submit test scores from the General Test of the Graduate Record Examinations (GRE) directly to the Graduate School. Letters of recommendation, usually three, preferably from members of the academic profession, are required by most departments. Prospective students should check with the program to which they are applying for specific application requirements. However, meeting the minimum requirements does not guarantee admission. Applicants must show promise of superior achievement and must have specific preparation for the course of study they wish to undertake. If their records indicate deficiencies, applicants may be refused admission or be required either to take background courses without graduate credit or to demonstrate by examination that they have acquired the requisite knowledge or skills for graduate study. In addition, since each graduate program has a limited number of places, the successful applicant must have a record competitive with those of other applicants in the same field.

## Regular and Provisional Status

Application procedures and required credentials for admission to regular status are specified above. Occasionally, students who hold the baccalaureate but do not qualify fully for admission to regular status may give sufficient evidence of ability in their chosen field to warrant their provisional admission to a master’s degree program only. (Applicants are not admitted provisionally to a doctoral program). Students who require F-1 or J-1 visa sponsorship are not eligible for provisional admission. Students admitted provisionally must have a cumulative baccalaureate grade point average of 2.6 or higher. If a provisional student’s initial 12 credits of completed coursework (excluding 1000-level courses) meet the minimum scholastic

requirement of the Graduate School, the student is accorded regular status. Otherwise, the student is subject to dismissal. In situations where special consideration is warranted, and only upon the specific request of the major advisor, the Dean of the Graduate School may approve changing a student to regular status if at least nine credits of advanced coursework have been completed with grades of “A+,” “A,” or “A-.” Regular, not provisional, status is required for degree conferral.

## Language-Conditional Status

Students whose native language is not English, regardless of visa status, must show evidence of proficiency in the English language by having earned either an Internet-based (IBT) TOEFL (Test of English as a Foreign Language) score of at least 79 or a Paper-based (PBT) TOEFL score of at least 550, an overall band score of 6.5 or greater on the IELTS Academic Module (International English Language Testing System), or an overall score of 53 or greater on the PTE (Pearson Test of English) Academic test. Some departments also require the Test of Spoken English (TSE) or the Test of Written English (TWE).

International graduate applicants whose English language proficiency does not meet the minimum standards necessary to qualify for regular admission may be admitted as Language-Conditional Students. Applicants will have 12 months to meet the language requirement by receiving a Certificate of English Proficiency from UCAELI (University of Connecticut American English Language Institute) and/or receiving a passing English proficiency score.

Students who are not native English speakers but expect to hold teaching assistantships must also satisfy the University’s English Proficiency Policy (available at [ita.uconn.edu](http://ita.uconn.edu)) before being allowed direct instructional contact. This policy applies to all prospective teaching assistants, regardless of citizenship or visa status.

## Post-Baccalaureate and Certificate Programs

The University of Connecticut offers two types of certificate programs: graduate certificates and post-baccalaureate certificates. Graduate certificate programs consist entirely of graduate courses (those numbered 5000 or above). Post-baccalaureate certificate programs consist either entirely of undergraduate courses (those numbered 1000-4999) or of a mixture of undergraduate and graduate courses. A certificate can be earned either as a “stand-alone” certificate (without simultaneous enrollment in a degree program) or while simultaneously pursuing a graduate degree.

To earn a certificate, students must first apply for admission to a certificate program through the Graduate School and must then satisfy the requirements of the certificate program to which they have been admitted. This applies to both external applicants and currently matriculated students who wish to pursue a certificate along with a graduate degree.

To be admitted to a certificate program, an applicant must hold an earned baccalaureate degree from a regionally accredited college or university or present evidence of the equivalent. Some certificate programs may require applicants to hold an advanced degree prior to admission. As for admission to degree programs, the applicant must submit official transcripts covering all previous work, undergraduate and graduate, which must be of at least the following quality: a cumulative grade point average (GPA) of 3.0 for the entire undergraduate record, or 3.0 GPA for the last two years of full-time coursework, or 3.5 GPA or higher in the entire final year of coursework prior to application to the certificate program. Non-degree students may take up to six credits before being formally admitted to a University of Connecticut certificate program. Students may not use courses completed at other institutions to satisfy requirements of a University of Connecticut certificate program. Currently matriculated University of Connecticut students must apply for admission to a certificate program in a term before all of the required courses are complete. If a student earns a certificate and is subsequently admitted to a related graduate degree program, all credits from the certificate may be counted toward the graduate degree, subject to the approval of graduate program faculty in that area of concentration. The

terminal date associated with the degree will be determined using the date of the first certificate class as the initial date of enrollment for the degree.

Occasionally, students who hold a baccalaureate degree but do not qualify for admission to a certificate program may be granted provisional admission, based on a recommendation from the program. Students admitted provisionally must have a cumulative bachelor's grade point average (GPA) of 2.6 or higher. If such a student does not meet the minimum academic standards of the Graduate School after completing three credits, the student is subject to dismissal and will be allowed to enroll only upon recommendation from the program.

## Non-Degree Study

Individuals with appropriate preparation who have not been admitted to any of the admissions categories described above may take courses as non-degree students. All non-degree students are presumed to be taking courses for reasons other than earning a certificate, sixth-year diploma in professional education, or a graduate degree at the University. Should they later be admitted to a graduate degree, certificate, or sixth-year diploma in a professional education program at the University, limited credits will be acceptable toward the degree. Credits accepted toward a graduate degree must be of "B-" quality or higher. For further information regarding Registration for non-degree coursework, contact the Office of the Registrar at registrar@uconn.edu or 860-486-3331.

## Transfer Credits

No coursework taken before the date of admission to the Graduate School may be used to meet program requirements for a graduate degree unless specific approval has been granted by the student's major advisor and the Dean of the Graduate School. In addition, credits taken prior to enrollment in a given program, whether taken at the University of Connecticut or elsewhere, must be of "B-" quality or higher to be accepted as transfer credits and used to meet program requirements. Individual programs may set higher standards for accepting transfer credits. Notwithstanding this minimum grade requirement, satisfactory grades on a University of Connecticut transcript graded on an S/U basis can be accepted as transfer credits.

## Admission of University Faculty

University of Connecticut faculty members who hold tenure or a rank higher than instructor leading to tenure ordinarily may not earn a graduate degree at this institution. Exceptions to this policy may be made by the Dean of the Graduate School, with the advice of the Executive Committee of the Graduate Faculty Council.

## New England Regional Student Program

The University of Connecticut participates in the New England Regional Student Program, a regional program administered by the New England Board of Higher Education. The program permits qualified residents of the New England states to study with reduced out-of-state tuition privileges. The purpose of the program is to expand opportunities in higher education for New England residents by making available on a substantially equal basis to all students those programs not commonly offered at every institution. This practice tends to reduce duplication of courses and thus to utilize most efficiently the higher educational facilities in each state. Detailed information about this program can be obtained from the New England Board of Higher Education, 45 Temple Place, Boston, MA 02111, or at nebhe.org.

## Application Processing Fee

A non-refundable fee of \$75 must accompany the application. It may not be applied toward other charges. This fee must accompany every application submitted. The fee is waived for a student applying to a doctoral degree program to immediately follow a master's degree program in the same field at the University, current University graduate students applying to a

certificate program, and current University Scholars applying to a master's program. (Fees are subject to change without notice.)

## Deadlines

Application deadlines vary across programs. Applicants should check with appropriate academic departments concerning deadlines, and they are advised to submit their applications for admission as early as possible. At a minimum, applicants should file the application for admission several months in advance of the first semester of coursework.

Students must be admitted and accept admission one month prior to the first day of classes for that term. Some programs may have earlier acceptance deadlines.

To study for a graduate degree, a student must be matriculated by the Dean of the Graduate School before the first day of classes in the student's admitted term. All credentials, including official transcripts covering all undergraduate and graduate work taken up to the time of application, as well as the non-refundable application processing fee, must be received by the Graduate School by deadline dates to be matriculated.

Students must arrive on campus on or before the first day of classes in their admitted term. Failure to meet these conditions may cause:

- A delay in stipend payments and a loss or reduction of tuition waiver benefits for students holding a graduate assistantship; and
- A delay of enrollment in a degree program until the following semester.

Admission will be cancelled if a student does not register for coursework in the semester or summer term to which they have been admitted. If this occurs, the student must reapply for admission with no certainty of being accepted. Students can request a deferral of admission for up to one year after their initial application term from the program to which they were admitted. These requests will be reviewed by the Graduate School.

## Supplementary and Departmental Transcripts

If a student is admitted before completing a baccalaureate or graduate degree or additional non-degree coursework that is in progress at the time of application, the student will not be permitted to register in future semesters prior to the completion of the degree or coursework and the submission of the official transcripts to the Graduate School. (This applies to all courses except courses taken at the University of Connecticut). Students must submit official transcripts by the end of the first semester of study. Until all transcripts have been received, the plan of study will not be approved. All transcripts submitted, including test scores, become the property of the Graduate School and are not returnable.

# Fees and Expenses

The schedule of fees contained on the Bursar’s Office website is expected to prevail during any given academic year, but the Board of Trustees and the Board of Governors for Higher Education reserve the right, at any time, to authorize changes in fees and to establish new fees applicable to all currently enrolled students.

Fee bills, covering the semester’s charges, are computed by and are payable to the Bursar’s Office no later than the Friday before the start of the semester.

## Financial Responsibility

Graduate students are permitted to register, to modify their course registrations without penalty, or obtain deferments through the first day of the semester. Graduate students become liable for payment of tuition and other required course-related fees beginning with the Friday before the semester starts whether or not they have attended any classes or have paid their fee bills as of that date.

Failure to receive a bill does not relieve a student of responsibility for payment of fees by the specified due date. A student who fails to make timely payment of an outstanding balance may be barred from all privileges normally accorded to a student in good standing. Additionally, any pending University employment authorization may not receive approval or may be subject to cancellation. If there is a question concerning a bill, it is the student’s responsibility to contact the Bursar’s Office directly at [bursar.uconn.edu](mailto:bursar.uconn.edu) for clarification and resolution.

If a graduate student does not fulfill their financial obligations to the University by the Friday before the semester starts or by the expiration date of an approved deferment, an enrollment and service restricting hold is placed on the student’s record.

## Application Processing Fee

A non-refundable fee of \$75 for electronic submission must accompany an application to the Graduate School. It may not be applied toward other charges. This fee must accompany every application submitted except for a doctoral degree program to follow immediately on a completed master’s degree program in the same field at this University, or for a University Scholar, or for a current graduate degree seeking student applying for a graduate certificate program. If applicable, a fee waiver may be available. Please review the Graduate School’s Fee Waiver Policy at: [grad.uconn.edu/admissions/fee-waiver-policy](http://grad.uconn.edu/admissions/fee-waiver-policy) or email the Graduate Admissions Office at [gradadmissions@uconn.edu](mailto:gradadmissions@uconn.edu).

## Post-Baccalaureate and Graduate Certificate Program Costs

Please see individual program descriptions for fees and credit costs, which can vary across different types of certificate courses. Refer to the Bursar’s Office website at: [bursar.uconn.edu](http://bursar.uconn.edu) for more information.

## In-State and Out-of-State Status

Each student must file an affidavit of residence with the application for admission to the Graduate School. A form for this purpose is provided as part of the application. On the basis of this information, each entering student is classified as either a Connecticut student or an out-of-state student. Failure to file the form will result in classification as out-of-state.

Questions concerning the classification of graduate students as resident (in-state) or non-resident (out-of-state) are resolved by the Graduate School. In the event that students believe they have been incorrectly classified, requests for review, along with supporting documentary evidence, should be directed to the Graduate School.

Residents of other New England states enrolled in certain graduate degree programs may be eligible for special tuition rates through the New England Board of Higher Education Regional Student Program.

# Office of the Bursar Website

Graduate students should refer to the Bursar’s Office website at: [bursar.uconn.edu](http://bursar.uconn.edu) for current tuition and fee information, procedures, and policies pertaining to graduate students and graduate programs.

## Reinstatement Fee

The Graduate School regulations require registration in each semester by all graduate degree, certificate, and post-baccalaureate program students, with the exception of those students on an approved leave of absence. All graduate students who fail to complete initial course registration by the end of the tenth day of classes of any semester will be dropped from active status and will be required to pay a penalty fee of \$65. The reinstatement fee is added to a student’s bill along with any registration fee that has accrued. Students who do not register for longer than a year will be required to reapply for admission. A letter from the major advisor justifying the use of previous coursework to satisfy current degree requirements is required to count previous coursework towards the new enrollment.

## Refunds and Cancellations of Charges

In order to be eligible for a refund or cancellation of charges, a student must formally withdraw from the University by following the University’s official withdrawal process, which includes dropping all courses currently being taken for credit.

The University grants a full refund of fees to any student dismissed for academic deficiency or other cause, provided that the dismissal takes place prior to the start of classes.

A student inducted into military service will receive a prorated refund or cancellation of charges based on their date of separation. The student in this situation must furnish the Bursar’s Office with a copy of the orders to active duty, showing this to be the reason for leaving the University.

Refunds or cancellations of charges are available on the following schedule for students whose programs are interrupted or terminated prior to or during a regular academic semester. The refund schedule applies to students taking an approved leave of absence, which follows the University’s official withdrawal process. When notice is received prior to the first day of classes of a semester, full refund (less nonrefundable fees) will be made if the fees have been paid in full. Thereafter, refunds or cancellations of refundable charges will be made according to the following schedule:

Remainder of the 1 <sup>st</sup> calendar week.....	90%
2 <sup>nd</sup> week .....	60%
3 <sup>rd</sup> and 4 <sup>th</sup> week.....	50%
5 <sup>th</sup> week through 8 <sup>th</sup> week.....	25%

# Assistantships, Fellowships, and Other Aid

The University of Connecticut supports the Council of Graduate Schools Resolution Regarding Graduate Scholars, Fellows, Trainees, and Assistants. Acceptance of an offer of financial support (such as a graduate scholarship, fellowship, traineeship, or assistantship) for the next academic year by a prospective or enrolled graduate student completes an agreement that both student and the Graduate School expect to honor. In that context, the conditions affecting such offers and their acceptance must be defined carefully and understood by all parties.

Students are under no obligation to respond to offers of financial support prior to April 15; earlier deadlines for acceptance of such offers violate the intent of this resolution. In those instances in which a student accepts an offer before April 15, and subsequently desires to withdraw that acceptance, the student may submit in writing a resignation of the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student not to accept another offer without first obtaining a written release from the institution to which a commitment has been made. Similarly, an offer by an institution after April 15 is conditional on presentation by the student of the written release from any previously accepted offer. It is further agreed by the institutions and organizations subscribing to the above resolution that a copy of this resolution should accompany every scholarship, fellowship, traineeship, and assistantship offer. Source: [cgsnet.org/april-15-resolution](http://cgsnet.org/april-15-resolution)

Support for graduate students engaged in degree study at the University of Connecticut comes from many sources. Two general types of financial aid support are available: (1) aid based on academic merit; and (2) aid awarded by the Office of Student Financial Aid Services (OSFAS).

1. Awards based on academic merit include: Graduate Assistantships (for teaching or research), University Predoctoral Fellowships, and Dissertation Fellowships. Application for merit aid such as graduate assistantships should be made directly to the academic department. Students interested in scholarships and fellowships offered through the Graduate School should monitor the website for appropriate application procedures and deadlines.
2. Aid awarded by the OSFAS include: Federal Direct Stafford Loans (FDSL), Federal Direct PLUS Loans, and Federal Work-Study (FWS). Citizens or permanent residents of the United States must apply for financial aid by completing the Free Application for Federal Student Aid (FAFSA) at [www.fafsa.gov](http://www.fafsa.gov). The University of Connecticut's on-time application deadline is March 1 (May 1 for entering graduate students).

Note: International students are not eligible to receive need-based financial aid.

All need-based financial aid recipients and merit-based award recipients must meet Satisfactory Academic Progress (SAP) requirements, which are based on federal regulations. These requirements include maintenance of an appropriate grade point average (3.00) and satisfactory completion of a percentage (75%) of the number of credit hours attempted in each award year, as well as not exceeding published credit maximums for the student's program plan. A warning is sent to students once they have reached their degree minimums. A complete text of this policy is available at [financialaid.uconn.edu/sap](http://financialaid.uconn.edu/sap).

Please visit [financialaid.uconn.edu](http://financialaid.uconn.edu) for more information related to the terms and conditions of financial aid awards.

## Graduate Assistantships, Fellowships, and Internships

Many graduate students engaged in full-time degree study at the University of Connecticut hold graduate assistantships for teaching or research, whereas others hold fellowships, traineeships, or internships. Support from any of these sources is subject to terms of the funding source and to approval by the Graduate School. A brief definition of each is as follows:

An assistantship (teaching assistantship or research assistantship) is awarded to a graduate student who provides teaching or research support to the University that is a part of the student's academic program. In recognition of this support, the tuition of the student is provided by the grant/contract funding agency (for research assistants) or the University (for teaching assistants).

Note that all assistantships must be administered through an academic department. A fellowship is awarded to a graduate student to pursue their academic program, but does not require the student to provide any teaching or research support to the institution. The tuition of a student receiving a fellowship must be paid by the student, the granting organization, the department and/or school/college, or by the University with prior approval. An example of this can be found in the Policy on Competitive Federal Graduate Awards at [policy.uconn.edu](http://policy.uconn.edu).

An internship is an experiential job placement designed to enhance the knowledge, skills, and abilities of a student, enhance their employability, and requires a student to perform specific work at the host's site. The tuition payment is the responsibility of the student, the host, or the external funding specifically designated for this purpose.

Note: Holders of an assistantship, fellowship, or internship are responsible for associated fees. The following information provides more details regarding assistantships, fellowships, and other forms of aid available through the University. Other sources may be available upon further inquiry, and graduate students are encouraged to seek opportunities for external sources of support, such as prestigious national fellowships. For more information, please refer to the Office of National Scholarships and Fellowships (ONS&F) website at [onsf.uconn.edu](http://onsf.uconn.edu).

### Graduate Assistantships

Graduate students who meet the criteria listed below are eligible for graduate assistantships. Appointments are ordinarily made for the nine-month period from August 23 through May 22. Recipients serve the University as teaching assistants, readers, or laboratory and research assistants. Graduate assistants ordinarily take fewer than the usual number of courses per year because of this added workload. To be appointed, to retain an appointment, or to be reappointed, a student must have been accorded regular (not provisional) status, must have been maintaining a cumulative grade point average of at least "B" (3.0) in any coursework taken, must be eligible to register (i.e., must not have more than three viable grades of Incomplete on their academic record), must be enrolled in a graduate degree program scheduled to extend through the entire period of the appointment or reappointment, and must be a full-time student, counting coursework and/or its equivalent together with assistantship duties (See "Course Loads"), throughout the period.

The holder of a full assistantship devotes one-half of available time to studies and one-half (approximately twenty hours per week) to assistantship duties, whereas the holder of a half assistantship devotes three-quarters of available time to studies and one-quarter (approximately 10 hours per week) to assistantship duties. Assistantships are not available for less than 10 hours per week.

Graduate assistants divide their full-time efforts between study and assistantship responsibilities. As a result, they may not hold concurrent employment outside the University without the written consent of their major advisor.

Stipend rates for graduate assistants in programs based at Storrs or a regional campus are graduated in terms of progress toward the advanced degree and experience. All graduate assistants in programs based at the Health Center are awarded the same stipend. Nine month rates for Storrs and the regional campuses can be found at [payroll.uconn.edu](http://payroll.uconn.edu). Twelve month rates for the Health Center can be found at [health.uconn.edu/student-services](http://health.uconn.edu/student-services). Stipend rates for graduate assistants are graduated in terms of progress toward the advanced degree and experience.

- **Level 1:** For graduate assistants with at least a baccalaureate degree.
- **Level 2:** For experienced graduate assistants in a doctoral program with at least a master's degree or its equivalent in the field of graduate study. Equivalency consists of 30 credits of appropriate coursework beyond the baccalaureate degree completed at the University of Connecticut, together with admission to a doctoral program.
- **Level 3:** For students with experience as graduate assistants who have at least a master's degree or its equivalent and who have passed the doctoral general examination.

Tuition (but not the General University Fee, the Graduate Matriculation Fee, or other fees) are waived for graduate assistants. (See "Tuition" for possible proration). If an assistantship begins or terminates during the course of a semester, tuition will be prorated on a weekly schedule, charged for that portion of the semester when the assistantship is not in force, waived when it is in force. This often results in an adjustment of the tuition charges, including partial assessment (if the student is registered throughout the semester for coursework for which tuition is charged) or a partial refund (if tuition has been paid).

A graduate assistant is eligible for health insurance. Graduate assistants should be aware that it is necessary to complete the proper forms to enroll in health insurance. Health insurance does not take effect automatically. The University requires that all students have health insurance. If you have other health insurance and do not want the GA Student Health Insurance plan, you may waive the coverage by using the "GA Online Enrollment/Waiver Application" located at: [hr.uconn.edu/ct-partnership-health-benefits](http://hr.uconn.edu/ct-partnership-health-benefits).

When graduate assistants at Storrs or a regional campus become eligible for a Level 2 or Level 3 stipend, their department may request an increase by filing a new employment authorization effective at any time after the student attains eligibility.

## **Additional Sources of Financial Support**

Many additional sources of funding for graduate education exist through both internal and external opportunities. Opportunities to seek external funding can be found through the office of National Scholarships and Fellowships at [onsf.uconn.edu](http://onsf.uconn.edu). A searchable database of opportunities can be accessed through the website, in addition to resources helpful to graduate students seeking to prepare competitive applications. Additional internal awards are available in many programs, and students are encouraged to seek information about awards on program websites. Although not exhaustive, the Graduate School website maintains a list of internal funding opportunities.

# Academic Regulations

## Registration

*By accepting admission, the student assumes responsibility for knowing and complying with the regulations and procedures set forth by the University.*

Applicants admitted on the basis of an expected baccalaureate or graduate degree must have completed all requirements for that degree prior to the start of classes. University of Connecticut seniors must have completed the baccalaureate prior to the start of classes. Otherwise, they must continue to register as undergraduates, even though admitted to the Graduate School and registering for graduate courses.

Occasionally, a University of Connecticut senior planning to enter the Graduate School has less than a full course load remaining to complete for graduation. Such a student may take advanced courses along with the remaining undergraduate courses and may count those advanced courses toward the graduate degree. Inclusion of up to six credits of such coursework is permissible under the following conditions: (1) the work is completed with grades of “B-” or above; (2) the student is later admitted to Regular status in the Graduate School; (3) the work is approved as part of the graduate plan of study; and (4) the work was not counted toward the baccalaureate degree. Notwithstanding item 1 above, satisfactory grades on a University of Connecticut transcript graded with S/U grading basis may be accepted as transfer credits.

Advance registration and fee payments are accepted on the assumption that students will remain eligible to continue, having met the scholastic standards of the Graduate School and by having complied with its regulations. The following instructions apply to students registering for most courses conducted on the Storrs campus. All degree-seeking students must register for courses using the Student Administration System and pay all fees either through the Bursar’s Office at [bursar.uconn.edu](http://bursar.uconn.edu) or online using the Student Administration System. All course charges (applicable tuition and fees) are due and payable by the close of business on the Friday before the semester starts. Late fees are assessed after that time. Part-time students who are not degree-seeking students must register through the Office of the Registrar at [nondegree.uconn.edu/registration](http://nondegree.uconn.edu/registration).

Both new and continuing students should make appointments with their major advisors to determine the courses in which they plan to enroll. Dates for registration are contained in the Academic Calendar. Depending upon course selections, most students should be able to register using the Student Administration System. Problems encountered during registration (including enrollment in restricted courses) may be taken to the Registrar’s office. Graduate students are permitted to register, to modify their course registrations without penalty, and to pay their fee bills or obtain deferments through the first day of the semester. Graduate students become liable for payment of tuition and other required course-related fees, however, beginning with the Friday before the semester starts whether or not they have attended any classes or have paid their fee bills as of that date.

### Continuous Registration

Master’s, doctoral, Sixth-Year in Education, graduate certificate, and post baccalaureate students must begin their programs with coursework and must maintain registration continuously each semester thereafter (except summer sessions) until all requirements for the degree have been completed. Registration may be maintained either by taking coursework for credit or by registering for one of the five non-credit Continuing Registration courses. These include Special Readings at the certificate (GRAD 5997), master’s (GRAD 5998), or doctoral (GRAD 6998) level; Master’s Thesis Preparation (GRAD 5999); and Doctoral Dissertation Preparation (GRAD 6999). Other zero-credit courses may be substituted, if appropriate. Non-credit registration requires payment of University fees.

International students should consult with the office of International Student and Scholar Services prior to registering for zero-credit courses.

Per U.S. immigration regulations, students with F-1 and J-1 status are permitted to register for zero credits only in their final semester of degree study. Continuous Registration is granted with the consent of the student’s major advisor and the student’s international advisor.

Failure to maintain Continuous Registration during the spring and fall semester results in the student’s inactivation. Reinstatement is possible within a year of last registration and payment of all fees. (See “Reinstatement Fee” in the Fees and Expenses section of the catalog). The consequences associated with matriculation via Continuing Registration rather than credit courses are addressed in the “Course Loads” section below.

Neither enrollment for Continuing Registration nor payment for it is required for any semester during the first 10 class days of which the student completes all requirements for a degree if it is the only degree the student is pursuing.

Any currently matriculated student taking coursework at another institution, either for transfer to a University of Connecticut graduate degree program or for any other reason, must register for Continuing Registration as specified above in any affected semester.

Enrollment in Continuing Registration is not required during the summer. To receive most forms of summer financial aid for study or research, a student must register for either five credits of coursework or one of the full-time research courses, GRAD 5960 (Full-Time Master’s Research) or GRAD 6960 (Full-Time Doctoral Research).

### Registration Deadlines

All graduate students registering with the University must register themselves and have their initial registration in place no later than the close of business of the first day of classes each semester. Additions to and deletions from a student’s class schedule may occur freely throughout the first ten business days of the term. Students who do not complete an initial registration by the close of business of the first day of classes are subject to a late registration fee.

### Course Loads

The number of credits and choice of courses for which a student registers is a matter to be discussed by the student and the major advisor. Graduate students may enroll in up to 20 credits per semester. If a student has extenuating circumstances that require them to take more than 20 credits, the major advisor must send a written request to the Graduate School for approval. A student may be classified as a full-time student in one of three ways: (1) enroll in nine or more credits of coursework; (2) enroll in six or more credits of coursework while holding a graduate assistantship (50 percent or greater); or (3) enroll in one of the four special purpose three-credit courses. These courses include GRAD 5960 (Full-Time Master’s Research), GRAD 6960 (Full-Time Doctoral Research), GRAD 5930 (Master’s Level Directed Studies), and GRAD 6930 (Doctoral Level Directed Studies). The former two courses may be taken by students who have completed all requirements for the respective degree except the research component and who have no other obligations at the University (i.e., no other coursework and no graduate assistantship). The latter two courses denote a full-time, off-campus directed project, such as an internship, field work, or other special activity. Students in GRAD 5930 or 6930 may hold graduate assistantships if those assistantships are in direct support of their studies. Such an assistantship may not be a standard teaching assistantship.

To be classified as three-quarter time, the student’s course credit load must be greater than six and less than nine credits per semester. To be classified as half time, the student’s course credit load must be between 4.5 and 5.99 credits per semester. A credit load of fewer than 4.5 credits per semester is considered less than half time. These criteria apply to all registered students at the University. The currently defined Continuing Registration courses (GRAD 5997, 5998, 5999, 6998, and 6999) are zero-credit “place-holder” courses denoting part-time study and do not count toward the credit load requirement for half-time, three-quarter-time, or

full-time enrollment status. Degree and certificate seeking students who do not need to be certified by the University as holding at least half-time enrollment status may use these courses to maintain registration on a part-time basis. For various reasons, the University may need to provide the institutional consideration of a “part-time” course credit load. A part-time course credit load is between one and 8.99 credits. Students holding graduate assistantships must register for six or more credits per semester. Such students are considered to be full-time students.

In addition to courses offered by each department, a student’s credit load may include GRAD 5950 (Thesis Research), GRAD 6950 (Dissertation Research), and other equivalent research courses defined by the Graduate School, including seminar and other “colloquium” courses that are not part of the plan of study. These variable credit courses carry “S” or “U” (Satisfactory or Unsatisfactory) grading, with the student’s major advisor as the instructor of record.

**Auditing Courses**

Students who do not wish to register for credit may be permitted to register as auditors under the following conditions: (1) they pay the appropriate tuition and fees for courses; (2) they obtain the consent of the instructor; (3) they audit only courses for which there are adequate classroom or laboratory facilities; and (4) in the case of students in degree programs, they obtain consent from their major advisors. All permissions and registrations for auditing courses must be filed in the Registrar’s office. Courses audited are entered on the student’s permanent record, but such courses cannot be used toward fulfilling requirements for a graduate degree at the University.

The privileges of an auditor in a course are limited specifically to attending and listening. Auditors must attend class regularly. The auditor assumes no obligation to do any of the work required of the course and is not expected to take any of the instructor’s time. In addition, the auditor does not submit any work, and is neither eligible to take any tests or examinations nor able to receive grades on all or any part of the course.

Students should not “sit-in” on classes for which they do not register as auditors. No audit enrollment request will be approved after the ninth week of the semester.

**Repeating Courses**

Any student who is regularly registered for courses and who satisfies the requirements shall receive credit except that no student shall receive credit for the same course twice, unless repeating the course is specifically authorized in the Graduate Catalog, as in a variable content course. Courses with the same number that cover the same course content cannot be counted more than once for credit. The parenthetical phrases (“Formerly offered as...”) and (“Also offered as...”) included in a course description as a cross reference indicate that a student may not take both the course and the cross-referenced course. A student is regularly registered for a course only if that student has conformed to all university or college regulations or requirements when applying to register.

A student may repeat a course previously taken two times without seeking permission in order to earn a higher grade. When a student repeats a course, credit shall be allowed only once. Furthermore, in the computation of the grade point average, the registered credit and grade points for the highest grade shall be included in the GPA calculation and the registered credit and grade for the lower grade shall remain on the transcript, but shall be removed from the GPA calculation.

The student should note that repeating a course that was previously passed can have negative consequences. For example, repeating a previously passed course may have an effect on financial aid. Students considering repeating previously passed courses should consult their advisors and Student Financial Aid Services staff. When a student repeats a course after receiving a degree, the student’s transcript will indicate a grade, but no registered credit, for the repeated course. The grade and registered credit recorded for the course prior to receipt of the degree shall continue to be included in the GPA and credit calculations.

A student must have major advisor permission to repeat a course that is listed as a prerequisite or corequisite for any course that the student has passed. For example, a student who received a “C” in ACCT 5121 and subsequently passed ACCT 5122 may not retake ACCT 5121 without permission.

**Graduate Schedule Revision Regulations**

**Adding Courses**

Section changes require the same authorization as other add/drop transactions.

Semester Period	Add
First and second weeks of classes	Registration
Third and fourth weeks of classes	Advisor, Instructor, and Department Head offering the course
After the fourth week	All of the above and the Dean

After the beginning of a semester or summer session, a student may not add a course if the instructor feels that elapsed time might preclude its successful completion. For degree and certificate seeking students, courses added after the tenth day of a semester or after the fifth day of a summer session term must be submitted to the Registrar’s office on a Schedule Revision Request form available at registrar.uconn.edu/forms.

Students may add courses during the first 10 days of classes without special permissions. In exceptional cases only, a student may add courses after the tenth day of classes with the consent of the student’s advisor, the course instructor, and the head of the department or program offering the course. After the fourth week, the permission of the student’s dean or dean’s designee is also required for adding classes.

**Dropping Courses**

Semester Period	Single Drop
First and second weeks of classes	Registration with NO “W” grade
Third through ninth weeks of classes	Advisor with “W” grade
After the ninth week	Dean; exceptions made only for extenuating circumstances

Discontinuance of attendance or notice to an instructor or to an advisor does not constitute cancellation of course registration, and may result in a failing grade on the student’s permanent record. Before terminating class attendance, the student should ensure that the course has been dropped officially. Until this has been done, the student is obligated to complete all work. No grade is recorded for courses officially dropped, but a mark of “W” is recorded to signify withdrawal from a course after the tenth day of the semester or after the first week of a summer session course. Cancellation of course registration does not automatically drop a course from a plan of study, nor does approved deletion of a course from a plan of study cause cancellation of course registration. The procedures are separate and unrelated.

During the first nine weeks of a semester or prior to the midpoint of a summer session course, a course may be dropped by the following procedure. Students registered directly by the Registrar’s office at Storrs must file a properly completed and signed Schedule Revision Request form with the Registrar’s office. This form is available on the Registrar’s office website at registrar.uconn.edu/forms. Non-degree students register and drop courses through the Office of the Registrar at nondegree.uconn.edu.

After the first nine weeks of a semester or the midpoint of a summer session course, students ordinarily are not allowed to drop a course. If, however, a student must drop a course because of illness or other compelling reason beyond the student’s control, the student must request special permission as early as possible and well before the last day of classes. Permission to drop a course or to change from participant to auditor is granted only for good cause. All students must obtain permission from the Graduate

School. Permission is granted only on the major advisor's written recommendation, which must be convincing and sufficiently specific regarding reasons beyond the control of the student. The recommendation should be accompanied by a properly completed and signed Schedule Revision Request form for the course(s) to be dropped. Students in the M.B.A. programs must obtain permission from the director of the program. Under no circumstances is a student at any location or in any program permitted to drop a course after the course has officially ended.

### Dropping All Courses

The general policies and procedures regarding dropping a course (above) apply to dropping all courses, whether the student wishes to remain active in the graduate degree program or to withdraw permanently from it. Permission from the Graduate School is required for the student either to remain active in the program or to leave in good standing. No refund is possible unless all coursework for credit is dropped.

### Course Grades

Instructors are required to file grades with the University Registrar for all credit-bearing courses taken by a student. Although instructors are free to set the standard of performance expected in their courses, the following uniform scale is published to encourage general agreement on the meaning of grades: Students are required to maintain in their course program at least a "B" (3.00) average, for which a grade point average will be computed using the following chart.

### Grades and Grade Point Formulas

Instructors grade graduate courses based on the following letter and point system.

Explanation	Final Grades	Grade Points
Distinction	A+	4.3
	A	4.0
	A-	3.7
Good Quality	B+	3.3
	B	3.0
	B-	2.7
Below Expected Standard	C+	2.3
	C	2.0
	C-	1.7
Unsatisfactory Quality	D+	1.3
	D	1.0
	D-	0.7
Failure	F	0
Satisfactory (Good Quality)	S	N/A
Unsatisfactory/(Failure)	U	N/A
Withdrawal	W	N/A
Continuing Registration	R	N/A

### Grades Below Expected Standard

- All "C" Grades: Course used in a supporting area may be of benefit to students who should not be discouraged from including work in their programs. Such work shall be identified on the plan of study. Plus and minus values may be assigned to all but failing grades, are entered on the permanent record, and are computed into the student's grade point average.
- All "D" Grades: Course may not remain on the plan of study and the student's eligibility to continue in the degree program is reviewed

by the student's advisory committee.

- Letters "F" and "U": Necessitates a recommendation by the advisory committee to the Graduate School as to whether or not the student shall be permitted to continue graduate study.
- Final grades of "S" (Satisfactory) or "U" (Unsatisfactory) are associated only with certain courses designated as such by the Executive Committee of the Graduate Faculty Council. Certain foreign language courses designed under method (2) for fulfillment of a doctoral language requirement also may carry the "S" or "U" grading option, if chosen by the student. (See "Foreign Language; Related or Supporting Area of Study"). An "S" is not computed into the student's grade point average whereas a "U" is viewed as an "F."

Graduate students are not permitted to take any course, undergraduate or graduate, on a Pass/Fail basis.

### Temporary Grades

Temporary grades signify that credit has not been earned in that course, and may subject the student to scholastic probation or dismissal. Temporary grades shall not prevent the calculation of either the semester or the cumulative grade point average.

### Temporary Grades Related to Incomplete Work

An instructor may assign a temporary grade for a course when student work is not completed within the semester.

Temporary Grade	Conditions for Assigning a Temporary Grade
N No basis for grade	A student has completed few or no assessments and no make-up schedule has been agreed upon with the instructor; the instructor has no basis for a grade.
I Incomplete Grade	A student has not completed all of the assessments but work completed is of passing quality and a make-up schedule has been agreed upon with the instructor.
X Final assessment absence	A student did not submit a final assessment and might by means of a satisfactory performance on the assessment complete the course with a passing grade. If in the opinion of the instructor such a student would fail the course regardless of the result of the assessment, the student shall be given a grade of "F."

If all work required to change a mark of "I" or "X" is not submitted to the University Registrar within 12 months following the end of the semester or session for which the mark was recorded, or within a shorter period of time specifically designated by the instructor, no credit is allowed for the course. For grades of "I," it is the student's responsibility to reach and to maintain an understanding with the instructor concerning the timely completion of the work. For grades of "X," it is the student's responsibility to seek the required permission to take the final examination from the Graduate School as soon as possible after it has been missed.

Upon the recommendation of the instructor to the Graduate School, a limited extension of an incomplete may be granted. The Graduate School is not obligated to approve an extension if the instructor of the course no longer is a faculty member at the University of Connecticut. If more than three courses have been left incomplete, the student may be required to complete those still viable before being allowed to register for additional coursework. Too many permanent incompletes on the record may be grounds for the student's termination or dismissal. An employment authorization for a graduate assistantship appointment may not be approved for a student who has four or more viable incomplete courses on their academic record.

For further information, the reader is referred to the document "*Key to the Transcript*," available from the Office of the Registrar.

## Significant Letters

Letter	Explanation
R	Administrative symbol signifying that a student is registered. Any zero-credit course (e.g., GRAD 5997, 5998, 5999, 6998, or 6999) for which a student registers appears on the permanent academic record with the letter "R" as the grade.
T	Course credit has been accepted in transfer from another institution.
W	Withdrawal from a course after either the 10th day of a semester course or the first week of a summer session course. Except in extraordinary cases where academic factors or extreme or unusual circumstances warrant it, this mark is not deleted from the permanent academic record.

### Changes of Course Grades

Grades are part of the student's permanent record; they should never be changed for reasons unrelated to course requirements or quality of work. Once the grade in the course has been submitted, an instructor may neither accept additional work nor give additional examinations.

Instructors should change grades for the following reasons: a computational error, clerical error, and the discovery of overlooked components in a student's body of work. In cases when the instructor concludes that a course grade ought to be changed, the instructor determines a corrected grade and initiates the grade change process. The head of the department or program offering the course and the dean of the school or college in which the course is taught will be notified of a grade change to ensure consistency.

### Appeals of Assigned Course Grades

If a student believes that an error in grading has occurred, the student may request (within six months of the final grade being posted) that the instructor review the grade. If the student cannot contact the instructor, then the student should contact the department head. When the course is in a non-departmentalized school or college, the student should contact that dean or the dean's designee.

If the instructor agrees that a grade change is justified, the instructor will initiate the grade change using procedures described by the Registrar.

If the instructor believes that the original grade is correct, the student has 30 days to appeal the decision to the head of the department in which the course is taught. The department head will seek input from the instructor and the student to determine their opinion related to the merits of the grade appeal.

If after this review the instructor and the department head agree that a grade change is justified, the instructor will initiate the grade change according to the procedures described by the Registrar.

If the instructor and the department head agree that a grade change is not justified, the department head shall notify the student in writing with a copy to the instructor. If the student is dissatisfied with the appeal decision, the student has 10 working days to request, through the dean of the school or college in which the course is taught, a review by a Faculty Grade Change Review Panel.

If the department head thinks that a grade change is justified but the instructor does not agree, the department head shall request, through the dean of the school or college in which the course is taught, a review by a Faculty Grade Change Review Panel. The department head's request shall be made within 10 working days of completion of the grade appeal review.

The Faculty Review Panel is composed of three full-time faculty members appointed by the dean of the school or college in which the course is taught. The panel will convene a hearing within 10 working days of notification of a case. Both the appealing student and the course instructor should be present at the hearing. The student will be given an opportunity to state the grounds on which he or she is appealing the grade.

The instructor will be given the opportunity to document the basis on which the grade was awarded. Both parties may present supporting evidence and/or request testimony of others. The Faculty Review Panel may request input from the department head.

If the Faculty Review Panel recommends a grade change, it is authorized to execute the change by sending to the Registrar a change of grade request signed by all the members of the panel. The panel will send a written report of the decision to the instructor, the student, the department head, and the dean of the school or college offering the course within 10 working days of the decision. This decision is considered final.

## Standards and Degree Requirements

Maintenance of good academic standing in the Graduate School requires a cumulative grade point average of 3.0 or higher at all times while enrolled in a graduate program. An official transcript of an individual's graduate academic career, however, includes grade point average calculations based on all coursework completed during the student's graduate career (including any 1000-level courses). Credits completed elsewhere and accepted in transfer by the Graduate School do not affect the student's University of Connecticut grade point average in any way.

Whenever a student's cumulative average falls below 3.0, the program is to be reviewed by the student's advisory committee to determine whether or not the student shall be permitted to continue graduate study.

The general academic standards and degree requirements of the Graduate School apply to all graduate students enrolled in certificate and degree programs. Some programs have additional requirements that are more detailed or tailored to the needs of the specific program. Students should acquaint themselves with all of the standards and degree requirements for their degree program, as specified in both the Graduate Catalog and official graduate program handbooks. Undergraduate and non-degree students taking a graduate course should consult the appropriate catalog for regulations that apply to them.

### Post-Baccalaureate and Certificate Programs

A certificate from the University of Connecticut provides post-baccalaureate students with critical knowledge in a specific field or niche. UConn's certificate programs may be offered face-to-face, entirely online, or in a blended/hybrid format. Those that involve a substantial online component are predominantly administered through UConn eCampus. Post-baccalaureate and graduate certificates can often be completed in a single year, allowing working professionals to update their skill sets or expand into an emerging area quickly.

Both post-baccalaureate and graduate certificate programs are offered through the Graduate School. Students are awarded certificates based upon completion of a well-defined program of coursework. A certificate is not a degree. Rather, it is a focused series of courses that, when completed, demonstrates competence in a coherent academic specialty. Detailed information concerning criteria and procedures may be obtained from certificate program coordinators.

To be awarded a certificate, a student must satisfactorily complete (with a cumulative grade point average of 3.0 or higher) a set of courses consisting of 12 to 15 credits specified in the certificate program requirements. In a small number of cases where detailed justification has been provided, a certificate program may require as few as nine credits. In certain cases where the appropriate programs have obtained specific prior approval, one three-credit course may be used simultaneously to satisfy course requirements in two different certificate programs. A student may enroll in a certificate program on either a part-time or a full-time basis, but the student must complete the requirements for the certificate within three years of initial enrollment.

Advanced coursework taken on a non-degree basis at the University of Connecticut may account for up to six of the course credits required toward a certificate's plan of study provided the following conditions are met: (1) courses are the appropriate level; (2) the grades earned in such coursework are "B-" or higher; and (3) such coursework is within the

time limit for completion of the certificate program requirements. Credits earned at other institutions may not be counted toward a certificate's plan of study. Non-degree coursework may be included on the plan of study only with the consent of the advisor.

Admission to a certificate program does not guarantee admission to a related degree program, but if a certificate student is admitted to a degree program, all credits from the certificate may be counted toward the graduate degree, subject to the approval of graduate program faculty in that field of study or area of concentration. The terminal date associated with the degree will be determined using the date of the first certificate class as the initial date of enrollment for the degree. Students should contact graduate program coordinators to determine whether credits earned as part of a certificate program satisfy degree requirements of any particular degree program.

### Graduate Degree Programs

The student is expected to register for coursework with reasonable regularity and to complete all requirements for the degree within a moderate span of time to assure continuity and adequate familiarity with developments in the field of study (see "Continuous Registration").

#### Time Limits

The student is expected to register for coursework with reasonable regularity and to complete all requirements for the degree within a moderate span of time to assure continuity and adequate familiarity with developments in the field of study. All work for the master's degree must be completed within six years from the beginning of the student's matriculation in the degree program. Work for the doctor of musical arts and doctor of philosophy degrees must be completed within eight years of the beginning of the student's matriculation.

Failure to complete the work within the periods specified or failure to maintain Continuous Registration (see "Continuous Registration") will require re-evaluation of the entire program and may result in a notice of termination.

A one-time extension of the student's terminal date of no longer than two years is considered only when there is substantial evidence that the student has made regular and consistent progress toward completion of degree requirements. A detailed recommendation to extend the terminal date must be signed by the major advisor and submitted in a timely manner to the Dean of the Graduate School.

#### Plans of Study

To become a candidate for a graduate degree, the student must have an approved plan of study or advisement report approved by their advisory committee or major advisor as appropriate for the degree program. Successful completion of all work indicated on the approved plan of study is a fundamental prerequisite to the conferral of the degree. Courses elected shall be consistent with the student's objectives and related to the field in which the degree is to be taken. The plan of study shall consist largely of courses at the 5000 level or above. Course credit by examination is not allowed as a means of accumulating credits to meet the requirements for advanced degrees at this institution.

Plans of study for master's and doctoral degree programs must be prepared and signed by the student and the members of the advisory committee. The Doctor of Musical Arts degree must also be approved by the Director of Graduate Studies in Music. Plans of study for master's degree programs must be submitted to the Graduate School for approval no later than the beginning of the student's final semester. Doctoral plans of study must be submitted to the Graduate School no later than when 18 credits of coursework have been completed.

Before drawing up and approving the plan of study, the major advisor should have on file and should consult for guidance a set of transcripts of all undergraduate and graduate work the student has taken. Failure to present the plan on time may prolong the period of study for the degree. Master's students may not take the final examination and doctoral students

may not take the general examination before the plan of study has been approved.

In addition to the content coursework and any required Related Area included in the plan of study, satisfactory completion of at least 15 credits of GRAD 6950 (Doctoral Dissertation Research) or GRAD 6960 (Full-Time Doctoral Dissertation Research) is required for doctoral degrees.

The plan of study for some programs also may designate a foreign language(s) in which the student is required to demonstrate reading knowledge and any Related Area courses. Course credit by examination is not allowed as a means of accumulating credits to meet the requirements for advanced degrees at this institution.

After approval of the plan, any request for change must be submitted to the Office of the Registrar on the *Request for Changes to Plan of Study form* bearing the signatures of the members of the advisory committee and the student.

#### Transfer Credit

A limited number of credits at the 3000 or 4000 level (not more than six) may be accepted for graduate degree plans of study.

Advanced coursework taken on a non-degree basis at the University may be included on the plan of study provided the following conditions are met: (1) the grades earned in such coursework are "B-" or higher; (2) such coursework is within the time limit for completion of the degree requirements; and (3) such credits have not been applied toward any other degree, at the University of Connecticut or elsewhere (already completed or to be completed in the future). Notwithstanding item 1 above, satisfactory grades on a University of Connecticut transcript graded with S/U grading basis may be accepted as transfer credits. In any event, inclusion of non-degree coursework on the plan of study requires the consent of the advisory committee. Such non-degree course credits may account for up to 25 percent of the credits required for a master's degree, provided the courses are at the graduate level. Up to 12 credits of University of Connecticut non-degree courses may be included on doctoral plans of study.

Any credits transferred to a graduate degree program at the University of Connecticut must not have been or be used toward a degree elsewhere (already completed or to be completed in the future).

### Master's Degree Programs

Master's degree programs are offered in a broad range of fields throughout the University. A master's degree program represents the equivalent of at least one year of full-time study beyond the baccalaureate (or its equivalent).

The Graduate School requires a minimum of 30 credits for a master's program, though some programs may require more. Ordinarily, the master's degree should be completed within three years.

The Master of Arts degree usually is awarded to qualified candidates in the humanities, the social sciences, education, and other non-scientific fields. The Master of Fine Arts is a terminal degree in the fields of Art, Digital Media and Design, and Dramatic Arts. The Master of Science degree is awarded to candidates in the natural, physical, mathematical, pharmaceutical, nutritional, and agricultural sciences, as well as Accounting, Nursing, and Engineering. Other master's degrees awarded include the Master of Business Administration, the Master of Dental Science, the Master of Engineering, the Master of Music, the Master of Public Administration, the Master of Public Health, and the Master of Social Work.

#### Thesis and Non-Thesis Master's Degrees

Master's degrees may be earned under either of two plans, as determined by the advisory committee. The Thesis plan emphasizes research activities while the Non-Thesis plan requires comprehensive understanding of a more general character. Non-Thesis plans in the Masters of Fine Arts emphasize research that culminates in a final Research Project. The Thesis plan requires no fewer than 21 credits of advanced coursework and no

fewer than nine additional credits of Master's Thesis Research (GRAD 5950 or 5960), as well as the writing and oral defense of a thesis. The Non-Thesis plan requires no fewer than 30 credits of advanced coursework and a comprehensive final examination if the program requires it. In either case, advisory committees may require the student to take other courses with or without graduate credit, depending on the student's objectives and previous preparation.

The advisory committee may require that the student take an exploratory examination to guide the committee in formulating the plan of study. Certain master's degree programs submit advisement reports for individual students at the conclusion of master's study rather than a plan of study. Advisement reports require the approval of the major advisor or program director.

### **Transfer Credit**

Up to 25 percent of the credits required for a University of Connecticut master's degree program may be accepted in transfer from other institutions provided these conditions are met: (1) the major advisor or the advisory committee indicates its approval of the transfer of credit(s) by signing the Plan of Study and the *Transfer Credit Request form* as appropriate for the degree program; (2) the courses must be at a level appropriate for a graduate degree and offered by an accredited institution; (3) such coursework is within the six year limit for completion of master's degree requirements; and (4) the grades earned in any courses to be transferred must be "B-" or higher. Notwithstanding item 4 above, satisfactory grades on a University of Connecticut transcript graded with S/U grading basis may be accepted as transfer credits. Official transcripts of any coursework to be transferred must be on file in the Graduate School. Once the approved plan of study or program plan is submitted to the Graduate School and official transcripts indicating satisfactory completion of the coursework to be transferred are received, the transfer of credit is noted on the student's permanent University of Connecticut academic record.

### **Master's Degrees for Doctor of Philosophy Students**

Students admitted to study for the degree of Doctor of Philosophy may earn a Master of Arts or Master of Science degree, if one is offered specifically in their field of study, under either the Thesis or the Non-Thesis Plan. Students also may apply for this degree if they have on file a fully approved Ph.D. plan of study including at least 30 completed credits of suitable content coursework taken at this University and have passed a master's final examination. They also may apply for this degree if they have completed at least 30 credits on an approved Ph.D. plan of study, have passed the doctoral General Examination, and have been recommended by their major advisor or by the Dean of the Graduate School for award of the master's degree. More than one master's degree may not be awarded at this institution to an individual student unless the degree titles are different or unless the degrees are earned in substantially different fields of study. The same course may not be offered for credit toward more than one degree, except in the case of officially approved dual degree programs.

### **The Master's Thesis**

The advisory committee must approve the topic and scope of the thesis and, upon its completion, ascertain that it represents an independent investigation of a significant topic and is an important contribution to ongoing research in the candidate's field. The thesis must be acceptable in literary style and organization.

Specifications for preparation of the thesis can be obtained from the Office of the Registrar's website at registrar.uconn.edu. It is the student's ultimate responsibility to be certain that the thesis conforms to the specification.

The thesis must be dated as of the calendar year in which all requirements for the degree are completed. The Graduate School requires the electronic submission of the thesis through Digital Commons, a University repository for public access. The final copy must meet all specifications outlined on the Office of the Registrar's website. The *Thesis Submission Checklist*

must be submitted to the Office of the Registrar with an Approval Page and the Report on the Final Examination bearing original signatures of all members of the advisory committee. No restrictions that limit or delay the accessibility, use, or distribution of the results of a master's student's research are acceptable if such delays are inconsistent with an embargo period requested by the student or if they interfere with the timely completion of a student's academic program.

### **Final Examination**

Fields of study may require that candidates complete a final examination as part of a master's degree. If a final examination is required, it must be completed no later than one year after completion of coursework or the thesis. The contents of the final examination are under the jurisdiction of the advisory committee. The student may not take the final examination before Regular graduate status has been granted. The advisory committee has discretion to determine whether the examination shall be written, oral, or both. Invitation to participate in an oral examination is issued by the advisory committee, although members of the faculty may attend. The examination must be completed by the published deadlines for the appropriate conferral period for the degree to be granted with that conferral date.

The decision as to whether a student has passed or failed the examination rests solely with the advisory committee, which shall take into account the opinions of other participating faculty members. The vote of the advisory committee must be unanimous. Following the examination, the major advisor shall communicate the results to the student and send a report on the official form to the Graduate School. If the student has failed the examination or if the advisory committee considers the result of the examination inconclusive, the committee has the option of requiring the student to retake it. In such cases, the recommendation must reach the Graduate School promptly, and any re-examination must take place within 12 months from the date of the original examination.

Under the Thesis plan, the examination may center on the candidate's research and its relation to the field of study as a whole, but may have a wider scope. Under the Non-Thesis plan, the examination shall be comprehensive and designed to assess the candidate's mastery of the field and ability to integrate the knowledge acquired. The final examination for M.F.A. candidates may include a focus on the candidate's research project and its relationship to the field.

### **Doctor of Musical Arts Degree**

The D.M.A. degree is the highest practice-oriented degree offered by the Graduate School in the field of Music. The program leading to its attainment is intended to give students of outstanding ability the opportunity to become creative contributors in musical performance and scholarship. Award of the degree testifies to broad mastery of the art of music, an ability to practice that art on an exceptionally high level, and acquisition of appropriate research skills.

The equivalent of at least two years of full-time study beyond the master's degree is required; the degree ordinarily requires at least 60 credits. The General Examination shall be passed within four years of the beginning of doctoral study. A five year time limit applies to the acceptance of foreign language courses (see "Foreign Language"). While certain minimum requirements are set by the Graduate School and the Music Department, it is important for students to realize that work toward this degree is not merely a matter of accumulating course credits or satisfying other requirements. The degree will be conferred only after the advisory committee and the Graduate Music Faculty are convinced that the student is able to demonstrate consummate artistry in a public forum, and has developed independence of judgment and mature scholarship.

The advisory committee may require that the student take an exploratory examination to guide the committee in formulating the plan of study. Once the plan of study is approved, the student and the advisory committee should reevaluate it regularly and modify it, following the established procedure, if appropriate.

### **Residence Requirement**

A graduate student can fulfill the special demands of a doctoral program only by devoting a continuous period of time to concentrated study, practice, and research with a minimum of outside distraction or employment. The D.M.A. student must complete one year (two semesters) of full-time study in residence. This residence period must be completed through registration for and completion of appropriate course loads or research at the Storrs campus. Students ordinarily must register for full-time student status during the residence period (See "Course Loads").

The principal criterion for full-time study as required for fulfillment of the doctoral residence requirement is whether the student is in fact devoting essentially full-time effort to studies, without undue distraction caused by outside employment. It is left to the advisory committee to determine whether a student's outside employment is a distraction that prevents the student from devoting essentially full-time effort to the planned program. The advisory committee will record this determination on the plan of study, along with a description of the nature, extent, and period(s) of outside employment during the residence period.

### **Foreign Language**

Students in all areas of concentration shall be required to have a competent reading knowledge of at least one foreign language appropriate to the general area of study.

Students should plan to meet the language requirement early in their graduate career and well before they begin preparation for the General Examination. Methods for establishing evidence of reading competence are the same as those for the Ph.D. (See explanation of the Foreign Language requirement under "The Doctor of Philosophy Degree").

### **Transfer Credit**

Transfer of credit for coursework completed at other institutions is approved only after the student has demonstrated the ability to do acceptable graduate work at the University of Connecticut. Such ability must be demonstrated by successful completion of graduate level University of Connecticut coursework. The maximum number of credits accepted from accredited institutions is 12, provided it is of at least "B-" quality and contributes to the objectives of the proposed doctoral program. Such graduate work may be approved for transfer provided that the General Examination is to be passed and all degree requirements are to be completed within the prescribed period of seven years from the beginning date of the earliest course, wherever taken, listed on the approved doctoral plan of study (See "Time Limits"). Transfer credit is not granted for individual courses used for a degree elsewhere (already completed or to be completed in the future). Instead, consideration is given to that degree program as an entity when the doctoral plan of study is being prepared.

### **Evaluation of Performance**

The advisory committee shall evaluate continually the student's performance. Any graduate student whose scholastic performance does not meet the minimum requirements of the Graduate School may be subject to dismissal. The first recital for all D.M.A. students, except for those in conducting, is considered to be a qualifying recital, and must be presented during the first year of D.M.A. study. The hearing for this recital is evaluated by the full performance faculty. Any student who does not demonstrate an appropriate level of performance in this hearing and recital is subject to dismissal.

### **General Examination**

The General Examination shall be taken near the end of the course program. Before arrangements for the examination are made, the foreign language requirement(s) should have been met and the plan of study must have been approved by the Executive Committee of the Graduate Faculty Council. The examination is comprehensive in nature and incorporates elements of music history and literature, music theory, performance practice, and practical application of these constituent components.

The examination is under the jurisdiction of the student's advisory committee and contains both written and oral components. Not fewer than

five faculty members, including all members of the advisory committee, constitute the examining committee and participate in the examination. The final decision as to whether or not the student has passed the examination is determined solely by majority vote of the examining committee.

After the examination, the major advisor communicates the results to the candidate and sends the official report on the examination to the Graduate School.

### **D.M.A. Dissertation Proposal**

The D.M.A. Dissertation proposal describing the intended research must be approved by the Graduate Studies Committee of the Music Department at least four months before the filing of the D.M.A. dissertation and it must be approved by the Executive Committee of the Graduate Faculty Council at least three months before the filing of the D.M.A. dissertation.

### **Candidacy, Recitals, and D.M.A. Dissertation Preparation**

Upon passing the General Examination, the foreign language requirements, and (in the case of all students except conducting majors) the qualifying recital, the student becomes a candidate for the degree of Doctor of Musical Arts. Students are notified of their advancement to candidacy.

Students in every D.M.A. area of concentration except conducting must present three full-length recitals during the course of study for the degree. The first of these is considered a qualifying recital, which must be preceded by a pre-recital hearing. This hearing must be presented on a designated date at least three weeks before the scheduled recital, and is adjudicated by the full performance faculty. Hearings for subsequent degree recitals may be held at the discretion of the major advisor or applied instructor. These recitals and concerts represent the culmination of the performance aspect of this degree, and will be judged according to the highest levels of musical artistry. Majors in conducting must appear in concert as conductors with an appropriate departmental ensemble. Appearances in multiple concerts are permitted provided that the amount of music prepared and performed is equal to a whole concert appearance.

A written dissertation representing research into some aspect of music performance, repertoire, or pedagogy is an important requirement of this degree. The D.M.A. dissertation is under the immediate supervision of a member of the music theory or music history faculty, and secondarily under the supervision of the advisory committee. It must be acceptable in literary style and organization. It is the student's responsibility to be certain that the dissertation conforms exactly to the specifications prescribed by the student's advisory committee. The D.M.A. dissertation receives no academic credit, although the 15 credits of GRAD 6950 are associated with its preparation. This document will uphold the highest standards of scholarship, identical to those required of Ph.D. dissertations.

The advisory committee will set a date for completion of the D.M.A. dissertation, allowing time for each advisor to make suggestions for revisions, and then will set a date for the final examination, allowing time for the student to make those revisions. In some cases, further revision of the dissertation may be required by the advisory committee as a result of the final examination. Final approval of the dissertation following the examination is indicated by the original signatures of all members of the advisory committee on the dissertation's final approval page. This must be submitted to the Graduate School following the examination. Final approval pages must be received at the Graduate School by the conferral period deadline in August, December, or May. The technical specifications for the preparation of the D.M.A. dissertation are identical to the specifications for the preparation of the Ph.D. dissertation (See "Candidacy and Dissertation Preparation").

No restrictions that limit or delay the accessibility, use, or distribution of the results of any student's research are acceptable, if such delays interfere with the timely completion of a student's academic program.

### **Final Examination**

The final examination is oral and under the jurisdiction of the advisory committee. It deals mainly with the subject matter of the D.M.A.

dissertation. It is held by the conferral period deadline in August, December, or May. Invitation to participate in the examination is issued by the advisory committee, although any member of the faculty may attend. Not fewer than five members of the faculty, including all members of the candidate's advisory committee, must participate in the final examination unless written approval for a lesser number has been secured in advance from the Dean of the Graduate School. The decision as to whether a candidate has passed or failed the examination rests solely with the advisory committee, which will take into account the opinions of any other participating faculty members. The vote of the advisory committee must be unanimous. Following the examination, the major advisor communicates the results to the student and verifies that the official report has been completed and signed for submission to the Graduate School.

### Doctor of Philosophy Degree

The Ph.D. is the highest degree offered by the University. The program leading to its attainment is intended to give persons of outstanding ability the opportunity to become creative contributors in a scholarly field. Award of the degree testifies to broad mastery of an established subject area, acquisition of acceptable research skills, and a concentration of knowledge in a specific field.

The Graduate School requires a minimum of at least 30 credits of content coursework beyond the baccalaureate (or its equivalent) or at least 15 credits of content coursework beyond the master's degree or other advanced degree in the same or a closely-related field of study (exclusive of any required Related Area).

Although certain minimum requirements are set by the Graduate School, it is important for students to realize that work toward this degree is not merely a matter of accumulating course credits or of satisfying other requirements. The degree will be conferred only after the advisory committee and the Graduate Faculty are convinced that the student has developed independence of judgment and mature scholarship in the chosen field. An individual may not earn more than one Ph.D. degree in a single field of study at this institution.

### Transfer Credit

Up to 30 credits of letter-graded, graduate-level academic work completed at accredited institutions may be accepted by the Graduate School in transfer provided the grade earned in any course to be transferred is "B-" or higher and any course to be transferred was taken within the time limit prescribed for the student's degree program. Official transcripts must be on file with the Graduate School to document any and all coursework accepted in transfer. Transfer of credit toward the Ph.D. degree requires the approval of both the advisory committee and the Graduate School. Submission by the advisory committee of the completed *Transfer Credit Request* form together with the signed Ph.D. plan of study is required.

### Related Area and/or Foreign Language Requirement

For all fields of study except those listed in the following paragraph, satisfactory completion of at least one related area or demonstrated reading reception / comprehension proficiency of at least one appropriate language other than English is required.

Fields of study which require neither a related area nor demonstrated reading knowledge or reception/comprehension proficiency of a language other than English currently include: Biomedical Engineering, Biomedical Science, Cell Biology, Chemical Engineering, Chemistry, Civil Engineering, Computer Science and Engineering, Ecology and Evolutionary Biology, Economics, Educational Leadership, Educational Psychology, Environmental Engineering, Human Development and Family Studies, Learning, Leadership and Education Policy, Linguistics, Materials Science, Materials Science and Engineering, Mechanical Engineering, Molecular and Cell Biology, Pathobiology, Philosophy, Physics, Plant Science, Political Science, Psychological Sciences, Public Health, and Statistics.

If a related or supporting area is required, the courses chosen must consist of a coherent unit of advanced (i.e., 4000 level or above) work outside the

major field of study (or area of concentration, if appropriate). Coursework toward the Related Area normally is taken outside the student's "home" department. The courses must be approved by the advisory committee as a part of the plan of study. With few exceptions, they must be taken at this institution. With the consent of the advisory committee, a three credit advanced course in mathematics or statistics passed satisfactorily at this institution may fulfill the otherwise six credit minimum requirement if the student's preparation contains a suitably advanced prerequisite course (i.e., equivalent to a 4000-level University of Connecticut course) passed satisfactorily at this or another institution (although no course credits will be accepted in transfer).

Whether a specific language is considered appropriate is determined by the advisory committee, which can base its decision on a variety of reasons (E.G., the existence of a significant body of literature relevant to the student's interests as reflected in the Plan of Study, expected relevance in the professional environment, or promotion of diversity in research). Students should plan to meet any language requirement early in their graduate careers and usually well before they begin preparation for the General Examination. One of five methods below may be used to establish evidence of reading or comprehension/reception competence in an approved language. The advisory committee may designate which method shall be used or may leave the choice of method up to the student. For methods (1) through (3), courses and examinations will not be accepted if passed more than five years prior to submission of the plan of study for approval.

1. The student may pass both semesters of an approved one year reading or intermediate course in the language with grades equivalent to "C" (not "C-") or higher. This requirement will be considered to be met if, in light of previous preparation, the student is permitted by the instructor to enter directly into the second semester of the one year sequence and earns a grade of "C" (not "C-") or higher. The courses may be taken by graduate students on a Satisfactory or Unsatisfactory basis, with a grade of Satisfactory denoting performance at the level of "C" (not "C-") or higher. Courses approved for this purpose include ASLN 1103-1104, FREN 1163-1164, GERM 1145-1146, and SPAN 1003-1004. Alternatively, the student may pass a course in a foreign language or literature at or above the 3000 level, provided that the reading for the course is required to be done in the language. Language courses taken at other institutions are not accepted.
2. The student may pass an examination set by a member of the University faculty (or, if approved by the advisory committee and the Graduate School, a faculty member at another college or university) designated by the student's advisory committee and approved by the head of the department in which the major advisor holds an appointment. The examiner may be a member of the same department but may not be a member of the student's advisory committee. The examination will include, but need not be limited to, the translation of a passage approximately 400 words in length. The use of a dictionary may be permitted at the option of the examiner. The translation is to be written in English unless permission is granted by the Executive Committee of the Graduate Faculty Council to write it in another language. Such permission is granted only if it is deemed in the best interest of the student and if an acceptable examiner is available. The examiner will choose the passage from among books or articles submitted by the major advisor. The passage may be the same for a group of students in the same field or may be selected individually for each student. The examination must be supervised and have a reasonable time limit. In the event that a student is studying a language not typically rendered in print/text form, such as American Sign Language (ASL), the examiner will provide an appropriate text that the student will translate into English. The result of the examination, whether passed or failed, must be reported to the Graduate School on the official form bearing the signature of the examiner.
3. A doctoral reading examination passed at another graduate school

of approved standing may be accepted in transfer (subject to the above five-year limitation) provided the examination was taken prior to the student's enrollment in the Graduate School.

4. The student may establish evidence of competence in the language through an official transcript stating that the baccalaureate or a higher degree was earned with that language as the major.
5. The student may establish evidence of competence in the language through documentation that it is the student's native language, learned in childhood and used primarily through at least secondary school.

### **Evaluation of Performance**

The advisory committee continually evaluates the student's performance. Any graduate student whose scholastic record does not meet the minimum requirements of either the program and/or the Graduate School may be subject to dismissal.

### **General Examination**

The doctoral General Examination usually is undertaken when the student has completed at least 75 percent of the content coursework listed on the approved plan of study.

The General Examination is under the jurisdiction of the student's advisory committee unless the members of the Graduate Faculty in a student's field of study have voted to assign jurisdiction for all or part of the examination to a differently constituted examining committee. The examination may be written, oral, or both. All members of the advisory committee must participate in any oral examination. A student is examined in the several facets of their field of study, not merely in the particular area of concentration. Advisory or examining committees may give a series of cumulative examinations, to be taken at intervals over the student's period of study. For practical purposes, the final part of such a series shall be regarded as "the General Examination," and its scope may be limited as the advisory or examining committee may judge appropriate.

The examining committee includes at least one faculty member representing each of the major areas addressed in the examination. Not fewer than five faculty members, including all members of the student's advisory committee, must participate in the examination. All examiners are invited to submit questions and to evaluate answers, but the final decision as to whether or not the student has passed the examination shall rest solely with the advisory committee unless the members of the Graduate Faculty in a student's field of study have voted to assign this authority to a differently constituted examining committee.

After the examination, the Report on the General Examination, indicating the result of the entire examination and the names of all faculty members participating, must be signed by the members of the advisory committee and submitted to the Graduate School no later than the date of the submission of the Dissertation Proposal for final approval by the Graduate School (see below).

### **Dissertation Proposal**

The Dissertation Proposal is to be prepared in consultation with the members of the advisory committee before the research is well underway. The Dissertation Proposal, bearing the signatures of the members of the student's advisory committee as well as the signature of the department or program head verifying satisfactory review by two experts (see the following paragraph) who are not members of the advisory committee, should be submitted to the Graduate School for final approval by the time the student has completed the ninth credit of GRAD 6950 or 6960. The Graduate School will not grant final approval of the Dissertation Proposal without proof of any required IRB, IACUC, or human stem cell approval granted by SCRO. In any event, the approved Dissertation Proposal must be on file in the Graduate School before the public announcement of the oral defense of the dissertation.

When the Dissertation Proposal has been completed and signed by the student and also has been approved by the members of the advisory

committee, the proposal then is submitted to the head of the department or program to which the student was admitted. The department or program head appoints reviewers from outside the advisory committee to conduct a critical evaluation of the Dissertation Proposal. The use of at least one reviewer from outside the University is encouraged. Reviewers may be appointed to evaluate an individual student's proposal, or they may be appointed to a committee responsible for reviewing all proposals in a particular field of study or group of related fields of study.

Dissertation Proposals are reviewed with the following questions in mind:

1. Is the proposal well written, well organized, and well argued?
2. Does the proposal describe a project of appropriate scope?
3. Does the student demonstrate knowledge of the subject and an understanding of the proposed method of investigation?
4. Does the student show awareness of the relevant research by others?
5. Does the student consider how the proposed investigation, if successful, will contribute to knowledge?

The department or program head's signature on the proposal when the review is completed confirms that the results of the review were favorable. The evaluation may take the form of a reading of the proposal or attendance at an oral presentation and discussion of the proposal. A copy of the signed approval form and Dissertation Proposal must be received by the Graduate School when the review process has been completed. Receipt by the Graduate School of the approved Dissertation Proposal and any required IRB, IACUC, or SCRO approval is a basic requirement for eligibility to schedule the oral defense of the dissertation and for conferral of the doctoral degree.

### **Candidacy, Dissertation Preparation, and Final Oral Defense**

Upon approval of the plan of study, passing the General Examination, and approval of the Dissertation Proposal by the Executive Committee of the Graduate Faculty Council, the student becomes a candidate for the degree of Doctor of Philosophy.

A dissertation representing a significant contribution to ongoing research in the candidate's field is a primary requirement. The preparation of the dissertation is under the immediate and continuous supervision of the advisory committee, and it must meet all standards prescribed by the committee and by the Graduate School. It must be acceptable in literary style and organization. Specifications for its preparation may be obtained from the Graduate School website under the section entitled Current Students, Doctoral Degree Program. It is the student's ultimate responsibility to be certain that the dissertation conforms to the specifications.

The oral defense of the dissertation must be announced publically by means of the University's online Events Calendar at least two weeks prior to the date of the defense. At this time, electronic tentative approval of the dissertation and an electronic working copy of the entire dissertation must be filed with the Graduate School (or with the Health Center, if appropriate). Not fewer than five members of the faculty, including all members of the candidate's advisory committee, must participate in the final examination, unless written approval for a lesser number has been secured in advance from the Dean of the Graduate School.

The decision regarding whether a candidate has passed, conditionally passed, or failed the examination rests solely with the advisory committee, which will take into account the opinions of other participating faculty members and other experts. The vote of the advisory committee must be unanimous. Following the examination, the major advisor communicates the results to the student and verifies that the official report has been completed and signed for submission to the Graduate School (or to the Health Center, if appropriate).

The abstract and dissertation must be dated as of the calendar year in which all requirements for the degree are completed, including submission of the dissertation. The Graduate School requires the electronic submission of the dissertation through Digital Commons, a University repository for public access. The final copy must meet all specifications outlined on the

Graduate School website. The *Dissertation Submission Checklist* must be submitted to the Graduate School with an approval page bearing original signatures of all members of the advisory committee. No restrictions that limit or delay the accessibility, use, or distribution of the results of a doctoral student's research are acceptable if such delays are inconsistent with an embargo period requested by the student or if they interfere with the timely completion of a student's academic program.

## Conferral of Degrees

### Conferral

Degree conferral requires that the student have a cumulative grade point average of 3.0 for all courses listed on the final Plan of Study and that all requirements for the degree have been completed satisfactorily by the deadline specified in the Academic Calendar. Degrees are conferred three times each year in August, December, and May. However, the only graduate Commencement ceremony is held annually in May. Students who qualify for degree conferral receive their diplomas by mail, normally within three months following conferral.

### Application for the Degree

Formal application for a degree to be conferred must be filed online by the degree candidate using the Student Administration System within the first four weeks of the student's final semester. This application may be withdrawn at any time by the applicant. Information and instructions can be found on the Office of the Registrar website under the section titled Graduation. If all required paperwork and submissions needed for conferral are not received by the Office of the Registrar at least two weeks prior to the intended conferral date, conferral is delayed to the next conferral period, even though all other degree requirements may have been completed on time.

### Commencement

The graduate Commencement ceremony is held once each year at the end of the spring semester. Individuals who have had degrees conferred at the end of the previous summer or fall semester, and candidates for degrees who complete degree requirements by the end of the spring semester may participate in the annual Commencement ceremony. Academic regalia appropriate for the University of Connecticut degree being conferred is strictly required for all who participate in the ceremony. Information concerning the Commencement ceremony, including academic regalia and guest tickets, is made available by the mid-spring semester, and can be found on the Graduate School website.

## Policy on Leave of Absence from Graduate Studies

A graduate student is defined as any individual who holds admission to the Graduate School to pursue a post-baccalaureate certificate, a graduate certificate, or graduate degree.

Under compelling personal or medical reasons, a graduate student may request a leave of absence from their graduate program for a period of up to twelve months or one calendar year. The request for a leave of absence must be made in writing using the Request for Leave of Absence from Graduate Studies form on the Graduate School website at grad.uconn.edu.

The completed application form must bear the signatures of the student's major advisor and the department or program head. The completed application form is to be submitted to the Graduate School for review and approval at least thirty days before the leave of absence is to commence, or the earliest date possible in extenuating circumstances.

Information provided in the application for a personal leave of absence must address the specific reason(s) prompting the request. Examples could include, but are not limited to, family leave and financial hardship. Applications for a medical leave of absence require documentation from an appropriate health care provider, which must be submitted along

with the Request for Leave of Absence from Graduate Studies form. In certain cases, the Dean of the Graduate School may request that a student provide documentation from an appropriate health care provider which certifies that the student has medical clearance to resume study at the conclusion of an approved leave of absence. In addition, consultation with university offices may be appropriate. For example, consultation related to assessment of the safety of the student's work environment may be requested by contacting the Division of Environmental Health and Safety at ehs.uconn.edu and accommodations and services for students with disabilities may be discussed with the Center for Students with Disabilities at csd.uconn.edu.

When students are on approved leaves of absence for the full duration of a fall or spring semester, they are not required to register for any credit or non-credit course. Requests submitted during an academic session will be reviewed on a case-by-case basis to determine the most appropriate mechanism for recording the period of leave (e.g., requests made prior to the open enrollment closing date may be dated to cover the entire semester). An approved leave of absence indicates that the student status will be recorded as "inactive" for the duration of the requested period of leave, and as such, the student will not have access to university services as a graduate student. In addition, the terminal date (the date determined by the Graduate School by which it is expected that all degree requirements will be completed) of any student granted a leave of absence will be extended by a period of time equivalent to the duration of the approved leave of absence. Thus, the period of the approved leave of absence will not be considered when calculating the time the student has spent working toward the completion of the degree. In contrast, a student who chooses to maintain Continuous Registration will maintain active status, which means the student will continue to pay associated fees, have access to university services as a graduate student, and the terminal date for degree requirements is not extended. Thus, the decision to choose a leave of absence versus Continuous Registration to maintain active status must be weighed accordingly. The refunds and cancellation of charges information found in the Fees and Expenses section of the catalog applies to students taking an approved leave of absence.

International students are strongly encouraged to thoroughly evaluate the implications of each decision on their student status. International students must obtain authorization from an international advisor at International Student and Scholar Services before any course is dropped. Failure to do so will be considered a status violation and it will result in termination of the student's SEVIS record. It is strongly recommended that students hold advisory meetings with international advisors if they are considering requesting leaves of absence.

The leave of absence can be extended up to a maximum of one additional 12-month period. The request must be resubmitted using the previously described procedures, and ultimately approved by the Graduate School. A leave of absence cannot exceed two full calendar years in duration. In such cases in which a student needs leave for more than a total of two calendar years, the student must reapply for admission to the Graduate School with no assurance of acceptance.

Approval of a leave of absence does not assure or guarantee that a graduate program, an academic department, the Graduate School, or the University would be in a position to provide financial support or a graduate assistantship to any graduate student upon their return to studies following an approved leave of absence. Students returning to studies after a leave of absence must work with appropriate faculty advisors and program personnel to resume their degree programs.

Reinstatement from an approved leave of absence will occur at the beginning of the appropriate academic term. To request reinstatement from an approved leave of absence, the student should complete the Request for Reinstatement from Leave of Absence from Graduate Studies form on the Graduate School website and submit it to the Graduate School.

## Termination of Status and Academic Dismissal

During a student's degree program, certain circumstances may lead to termination of status or dismissal from the Graduate School.

### Termination of Status

To remain in good standing, a student must at all times have a major advisor and be within the degree time limits for the degree the student is seeking. Once a student's plan of study has been approved by the Graduate School, the student at all times must have a duly constituted advisory committee, minimally including a major advisor. (Refer to the Advisory System section for additional information regarding the advisory committee).

A student's major advisor may resign from the advisory committee by written notice to the Graduate School and the student. If the student does not identify a new major advisor within 30 business days of the resignation, the student's graduate degree program status is terminated. When the resignation occurs during a summer session or winter session, the 30 business days begin on the first day of classes of the next fall or spring semester.

A graduate student and the major advisor must always be cognizant of the time limits associated with the student's degree. The student, the major advisor, and the graduate program director and/or department head are notified of the date by which requirements must be completed when the Graduate School sends approved copies of the student's plan of study. Any request to extend the date by which requirements must be completed must be submitted in writing to the Graduate School, and must be accompanied by a written endorsement from the major advisor.

Extensions of the terminal date are granted by the Graduate School only on the basis of substantial evidence that the student is making consistent and satisfactory progress toward the completion of degree requirements, and with certification by the major advisor that the student is likely to complete within the requested extension period. If an extension is granted, it establishes a new terminal degree date for the student. Whenever a student's graduate degree program status is terminated, the student receives notice from the Graduate School. The student may appeal the termination under the provisions outlined below under the "Academic Dismissal and Termination of Status Appeal Procedures" sections.

### Academic Dismissal

A graduate student's progress in a degree program must be monitored regularly by the student's advisory committee. If at any time, a student's academic performance, progress in a graduate degree program, or professional development and/or suitability is judged by the advisory committee to be unsatisfactory to the degree that dismissal is warranted, the advisory committee must submit its written recommendation that the student be dismissed on such grounds. A student may be dismissed for:

1. Failure to maintain the minimum cumulative grade point average required by the Graduate School (3.0);
2. Receiving a grade of "D+," "D," "D-," "F," or "U" in any course;
3. If required, failure to satisfy a foreign language requirement for a degree;
4. Failure of the doctoral General Examination, if one is required;
5. Failure to produce an acceptable Doctoral Dissertation Proposal, if one is required;
6. Unsatisfactory performance in any aspect of the research or writing for a required master's thesis or doctoral dissertation;
7. Failure of a required final examination for the master's or doctoral degree; or
8. Failure to satisfy any other requirement of the student's graduate degree program.

The major advisor submits the written recommendation for academic dismissal to the Graduate School on behalf of the entire advisory committee, indicating the specific judgment on which the advisory

committee's recommendation is based. For a student who does not have an established advisory committee, the major advisor alone submits the recommendation. Whenever a student is dismissed on academic grounds, the student receives notice from the Graduate School. The student may appeal the termination under the provisions outlined in Complaint, Appeal, and Hearing Procedures.

# Advisory System

Degree programs are planned by the advisory committee after consultation with the student, unless a field of study has established a uniform curriculum. There is considerable flexibility in meeting special needs insofar as these are consistent with the regulations of the Graduate School. A degree program may entail coursework in more than one field of study, but each program must include a coherent emphasis within one existing field of study and area of concentration, if applicable.

A major advisor must be appointed at the appropriate level by the Dean of the Graduate School, by authorization of the President of the University, to advise in a particular field of study or area of concentration. In applying for admission, an applicant may indicate a preference for a particular major advisor. If at the time of admission an applicant expresses no preference, or if the preferred advisor is unable to accept, another advisor may be appointed. Since consistency of direction is important, a durable relationship between the student and advisor should be formed as early as possible. Occasionally, it may be desirable or appropriate for a student's degree program to be directed by co-major advisors (not more than two). Each co-major advisor must hold an appropriate Graduate Faculty appointment in the student's field of study and area of concentration (if applicable).

If a change of major advisor becomes necessary for any reason, the student must file a special form, bearing the signature of the new advisor, with the Graduate School. The Change of Major Advisor form can be found on the Registrar's website at registrar.uconn.edu.

If a major advisor decides that it is not possible to continue as a student's major advisor and wishes to resign, the Graduate School must be notified in writing as soon as possible. The student is then provided with a reasonable opportunity to arrange for a new major advisor. If a new major advisor is not identified within 30 business days of the resignation of the former major advisor, the student's graduate degree program status is terminated. When the resignation occurs during a summer session or winter session, then the 30 business days begin on the first day of classes of the next fall or spring semester. A student whose status has been terminated may request a hearing by filing a written request within 30 days of receipt of the letter of termination.

Unless a field of study has established another advisory system, the advisory committee of a master's degree student is formed after consultation between the major advisor and the student. The advisory committee, if an advisory committee is required, must include at least two associate advisors, one of whom must hold a current appointment to the Graduate Faculty. An associate advisor must possess suitable academic or scientific credentials in the student's field of study. The advisory committee should be formed before the student has completed 12 credits of degree program coursework and shall then supervise the remainder of the student's degree program.

Unless a field of study has established another advisory system, the advisory committee of a doctoral degree student is formed after consultation between the student and the major advisor and shall consist of at least two associate advisors with suitable academic or scientific credentials. The major advisor and at least one associate advisor shall be members of the Graduate Faculty appointed to advise doctoral students in the student's field of study and area of concentration, if applicable. In addition to the three or more members, another member, ordinarily a member of the Graduate Faculty outside the student's field of study but in a related field may be appointed by the Dean. If the advisory committee consists of three members, decisions must be unanimous. If the advisory committee consists of four or more members, decisions are considered adopted if there are no more than one negative vote, although the major advisor must always vote in the affirmative. Advisory committee decisions involving the outcome of the General Examination, approval of the Dissertation Proposal, oral defense of the dissertation, or approval of the dissertation itself, must be a unanimous vote. Readers, examiners, or other reviewers who have not been recognized as associate advisors by the Graduate School are not members of the student's advisory committee.

A member of the University of Connecticut's Graduate Faculty who has retired from active service may be considered for appointment as major advisor for a newly-admitted master's or doctoral student. Application is made to the Executive Committee of the Graduate Faculty Council and requires submission of a curriculum vitae and the endorsement of the appropriate department or program head. The retired faculty member must present substantial evidence of ongoing research and scholarly activity in the field. Separate application is required for each newly-admitted student for whom a retired faculty member wishes to serve as major advisor. Such appointments are made by the Dean with the advice of the Executive Committee.

A current graduate student may not serve as a member of another graduate student's advisory committee. If deemed appropriate by a graduate student's major advisor, the major advisor may request that a suitably qualified external associate advisor be appointed to the student's advisory committee by writing to the Graduate School. The request should be accompanied by curriculum vitae for the individual being recommended for appointment. Such appointments are made on the basis of advanced training and significant experience in the field of study. An appointment as external associate advisor is limited to an individual student's advisory committee and does not imply in any way membership on the Graduate Faculty of the University. Ordinarily, not more than one external associate advisor is appointed to any master's or doctoral student's advisory committee. The major advisor and at least one associate advisor on any doctoral student's advisory committee must be members of the University's Graduate Faculty.

The major advisor of any master's or doctoral student is responsible for coordinating the supervisory work of the advisory committee. Therefore, when the major advisor is to be on leave or is not in residence, it is the major advisor's responsibility to appoint an acting major advisor. The acting major advisor must be a member of the University's Graduate Faculty or be fully eligible for such an appointment. The acting major advisor will assume all duties and responsibilities of the major advisor for the duration of the appointment. The major advisor will inform the Graduate School of the appointment and provide any information that may be required concerning the credentials of the acting major advisor.

Students' advisory committees are accountable directly to the Dean of the Graduate School. For advisory committees of doctoral students, it is required that the written consent be obtained from the Graduate School before any changes are made in the membership of an advisory committee which has been duly established.

# Scholarly Integrity and Misconduct

Scholarly activity at the graduate and postdoctoral level takes many forms, including, but not limited to, classroom activity, laboratory or field experience, writing for publication, presentation, and forms of artistic expression. Integrity in all of these activities is of paramount importance, and the Graduate School of the University of Connecticut requires that the highest ethical standards in teaching, learning, research, and service be maintained.

Scholarly integrity encompasses “both research integrity and the ethical understanding and skill required of researchers/scholars in domestic, international, and multicultural contexts.” It also addresses “ethical aspects of scholarship that influence the next generation of researchers as teachers, mentors, supervisors, and successful stewards of grant funds” (Council of Graduate Schools, Research and Scholarly Integrity in Graduate Education: A Comprehensive Approach, 2012).

The Graduate Faculty Council, in accordance with the provisions of its By-Laws, has adopted this policy concerning scholarly integrity in graduate education and research and has approved the procedures set forth herein for addressing alleged violations. The Dean of the Graduate School shall coordinate the reporting, investigation, and determination of alleged breaches of scholarly integrity by graduate students and postdoctoral scholars in accordance with this policy. Members of the Graduate Faculty have primary responsibility to foster an environment in which the highest ethical standards prevail. All members of the University community have a responsibility to uphold the highest standards of scholarship, which encompasses activities of teaching, research, and service, and to report any violation of scholarly integrity of which they have knowledge. Instructors have a responsibility to take reasonable steps to prevent scholarly misconduct in their courses and to inform students of course-specific requirements.

Note: Student misconduct other than scholarly misconduct, as defined herein, is governed by the Student Code, which is administered under the direction of the Office of the Provost. Enforcement of its provisions is the responsibility of the Director of Community Standards. At the Health Center, student misconduct other than scholarly misconduct is governed by the Health Center Rules of Conduct.

## Definitions of Scholarly Misconduct

Scholarly misconduct is broadly defined as a failure to uphold standards of scholarly integrity in teaching, learning, research, or service. For the purpose of this Policy, scholarly misconduct shall be deemed to include, but not be limited to, the following types of misconduct. The list is not intended to be exhaustive, but does identify major categories of scholarly misconduct, and provides illustrations where appropriate.

Cheating involves dishonesty during a course, on an examination required for a particular degree, or at other times during graduate study, e.g., copying the work of another student.

Plagiarism involves using another person’s language, thoughts, data, ideas, expressions, or other original material without acknowledging the source. (Adapted from Council of Writing Program Administrators, *Defining and Avoiding Plagiarism: The WPA Statement on Best Practices*, 2003).

Distorted reporting involves “any omission or misrepresentation of the information necessary and sufficient to evaluate the validity and significance of research, at the level appropriate to the context in which the research is communicated” (D. Fanelli, *Nature*, 494:149; 2013).

Fabrication or falsification of grades involves any form of falsification of coursework or tampering with grades, e.g., a student making unauthorized changes to their own grades or an instructor consciously misreporting grades of students.

Misrepresentation involves taking an examination for another student, submitting work done by another individual as one’s own, submitting the

same work for evaluation in two or more courses without prior approval, unauthorized use of previously completed work or research for a thesis, dissertation, or publication, or making false, inaccurate, or misleading claims or statements when applying for admission to the Graduate School or in any scholarly or research activity, including publication.

Academic or research disruption involves unauthorized possession, use, or destruction of examinations, library materials, laboratory or research supplies or equipment, research data, notebooks, or computer files, or it might involve tampering with, sabotage of, or piracy of computer hardware, computer software, or network components.

Fabrication or falsification in research involves falsification of, tampering with, or fabricating results or data.

Research violations include violation of protocols governing the use of human or animal subjects, breaches of confidentiality, obstruction of the research progress of another individual, or disregard for applicable University, local, State, or federal regulations.

Professional misconduct involves violation of standards governing the professional conduct of students in particular fields (e.g., pharmacy, nursing, education, counseling, therapy).

Deliberate obstruction involves hindering investigation of any alleged act of scholarly misconduct.

Aiding or abetting involves actions that assist or encourage another individual to plan or commit any act of scholarly misconduct.

A version of this policy was first approved and adopted by the Board of Trustees on November 10, 1998. It was amended on April 24, 2013. This version was approved and adopted by the Board of Trustees on March 26, 2014.

## Addressing Allegations of Scholarly Misconduct

The University of Connecticut reserves the right to revise, amend, or change these procedures as deemed appropriate by the Graduate School. The procedures published in the Graduate Catalog in effect at the time of the alleged violation will control.

Allegations of scholarly misconduct will be addressed in accordance with the procedures set forth below. If a graduate student accused of scholarly misconduct is part of a combined degree program, the appropriate Associate Dean of the Graduate School (whether for Storrs and the regional campuses or UConn Health) and the academic leader of the other degree program will determine whether the complaint will be addressed in accordance with these procedures or in accordance with those of the other degree program, using the procedures of the program to which the alleged misconduct is more germane.

### Misconduct Allegedly Committed Within an Academic Course

When an instructor or relevant dean or department head believes that an act of scholarly misconduct within an academic course has occurred, the procedures set forth below shall be followed:

The instructor, dean or department head who believes that scholarly misconduct has occurred within an academic course (the Complainant) shall retain all evidence of the alleged misconduct in its original form.

Original papers or other materials need not be returned to the accused student. Copies of the accused student’s work will be provided upon request. All instructors within the course shall be notified of the allegation and the proposed academic consequences before the student is notified of the alleged misconduct.

Within 30 business days of becoming aware of alleged misconduct, the Complainant shall notify the accused student and their major advisor in writing of the allegation of misconduct and the academic consequences to be imposed. The notice shall be sent by the Complainant to the accused student by email, to the student’s official University email address, and, if appropriate, by first class mail, postage prepaid, to the mailing address on file with the University. The notification shall advise the student that they

have 10 business days from the date the notice is sent via email to contact the Complainant to address the alleged misconduct and/or file an appeal, and that if the student fails to do so, the academic consequences described in the notice shall be imposed. The Complainant will provide a copy of the written notification sent to the accused student to the Graduate School, and also will maintain a copy. (Complainant may use the Scholarly Misconduct Graduate School Reporting Form). The Graduate School shall notify the Complainant of the receipt of an appeal filed by the accused student within five business days. If an appeal is filed, the Complainant shall within five business days forward to the Graduate School information supporting the allegation.

An accused student may file an appeal in writing with the Graduate School. Please see the Complaint, Appeal and Hearing Procedures of the Graduate School.

The procedures for evaluating the appeal and referral to a hearing will follow the guidelines set forth in the Complaint, Appeal and Hearing Procedures of the Graduate School.

A student who has been notified that they have been accused of scholarly misconduct may not withdraw from the course in which the alleged misconduct has occurred without the approval of the Dean of the Graduate School. If a semester concludes before a scholarly misconduct matter is resolved, the student shall receive a temporary "I" (Incomplete) grade in the course until the instructor submits the appropriate grade.

### **Misconduct Allegedly Committed Outside of an Academic Course**

A substantial portion of graduate and postdoctoral study takes place in contexts where they are not students within a course (e.g., serving as a teaching or research assistant, working as an intern, conducting research and disseminating findings, and taking a written or oral general exam). Allegations of scholarly misconduct committed outside of an academic course will be addressed according to the procedures described in this section. When any person (the Complainant) believes that an act of scholarly misconduct outside of an academic course has occurred, the procedures set forth below shall be followed:

The Complainant shall retain the evidence of the alleged misconduct in its original form.

Within 30 business days of becoming aware of alleged misconduct, the Complainant shall notify the accused person and if applicable, their major advisor, in writing of the allegation of misconduct and the course of action to be taken. The course of action will include academic consequences and if appropriate, referral to entities inside or outside the University for further investigation. The Complainant shall send the notice to the accused person by email, to the student's official University email address, and if appropriate, by first class mail, postage prepaid, to the mailing address on file with the University. The notification shall advise the student that there are 10 business days from the date the notice is sent via email to file an appeal through the Graduate School and that if the student fails to do so, the course of action and any academic consequences described in the notice will be imposed. The Complainant will provide a copy of the written notification sent to the accused student to the Graduate School, and also will maintain a copy. The Graduate School shall notify the Complainant of the receipt of an appeal filed by the accused student within five business days. If an appeal is filed, the Complainant shall forward to the Graduate School information supporting the allegation within five business days.

The accused person may file an appeal through the Graduate School. Please see the Complaint, Appeal and Hearing Procedures of the Graduate School. Examples of referrals to inside or outside the University include:

Cases involving allegations of research misconduct on a sponsored project by graduate students or postdoctoral scholars enrolled at Storrs or regional campuses will be referred to the Vice President for Research for review under the Policy on Alleged Misconduct in Research. Cases involving allegations of research misconduct by students enrolled at the Health Center will be referred to the Research Integrity Officer for action under the Policy on Review of Alleged Misconduct of Research.

Cases involving alleged violation of standards governing the codes of conduct for students in professional fields (e.g., pharmacy, nursing, education, counseling, and therapy) may be subject to additional review by other entities inside or outside the University (e.g., professional organizations or credentialing boards).

# Complaint, Appeal, and Hearing Procedures

The University of Connecticut reserves the right to revise, amend, or change these procedures as deemed appropriate by the Graduate School. The procedures published in the Graduate Catalog in effect at the time of the alleged violation will control.

The University of Connecticut is a community of scholars committed to integrity, freedom of inquiry and intellectual pursuit, respect for individuals and the rights of others, and tolerance for both individual differences and differing points of view. Accordingly, a fundamental responsibility of the Graduate School is to foster durable, harmonious, and productive working relationships among graduate students, postdoctoral scholars, faculty members, staff, and administrators.

Attempts by all parties to resolve disputes are strongly encouraged before pursuing resolution through the Graduate School. Assistance with problem-solving and mediation toward resolution should be pursued at local levels (e.g., program, department, and/or school) and also is available through the University Ombuds: [ombuds.uconn.edu](http://ombuds.uconn.edu). In the event that a resolution is not reached following such good faith efforts, and as an action of last resort, either party may engage in the hearing procedure through the Graduate School. In rare cases, the actions or behaviors alleged in the dispute may be sufficiently extreme that it would be unreasonable to expect the Complainant, the person(s) filing the complaint or appeal, to attempt a prior resolution.

## Pursuing Dispute Resolution through the Graduate School

To begin the formal dispute resolution process through the Graduate School, the Complainant will submit either an appeal form or a complaint form (See “Filing a Complaint” and “Filing an Appeal” later in this document). A staff member from the Graduate School will contact the person who submitted the form within two business days to discuss the hearing procedures, answer any questions, and collect any additional information. Information will then be forwarded to the Hearing Officer, the Associate/Assistant Dean of the Graduate School.

The Hearing Officer will review the information submitted, may request additional clarification from either party, and will consider all relevant information in determining whether the case should be referred to a Hearing Committee, a panel of two graduate faculty members and one graduate student. In particular, evidence of “good faith effort” at mediation will be considered. Within 25 business days of the student submitting the written complaint/appeal, the Hearing Officer will determine whether the case should be referred to a Hearing Committee. The following issues are not managed through the Graduate School Hearing Procedures and therefore will not be forwarded to a Hearing Committee: belief of an error in grading (Challenges to a Grade process-[guide.uconn.edu/instruction/challenges-to-a-grade/](http://guide.uconn.edu/instruction/challenges-to-a-grade/)) and matters addressed by other existing University policies or procedures including, but not limited to, allegations of research misconduct on federally sponsored projects, conduct proscribed by the Student Code, harassment, complaints of retaliation and/or retaliation, employment matters, and conflicts of interest.

If the case is forwarded to the Hearing Committee, both parties will be notified of the reason for the hearing and scheduled hearing date. The hearing will be scheduled by the Hearing Officer no later than 30 business days after notification to proceed with a hearing.

If the Hearing Officer decides not to convene a Hearing Committee a rationale will be provided and the decision cannot be appealed. If a “good faith effort” was not shown, the Complainant will be encouraged to seek resolution through direct communication with the person(s) against whom the complaint is directed and/or through procedures available through the relevant graduate program, department, school or college, and university,

as applicable. If these attempts at resolution fail, the Complainant may file a new complaint or appeal no sooner than 30 business days after the notice declining to convene a Hearing Committee was sent.

Note: The Associate Dean/Assistant Dean of the Graduate School (the Hearing Officer) with jurisdiction (Storrs or UConn Health) may at their sole discretion determine that a complaint or appeal falls under the jurisdiction of The Student Code, the Policy on Scholarly Integrity in Graduate Education and Research, the Policy Statement on Harassment, the Policy on Conflict of Interest in Research, or any other existing University policy that provides for resolution of complaints. Should the Hearing Officer determine that the complaint should be addressed through other procedures, they will notify the parties involved and refer the complaint to the appropriate University officials.

## Filing a Complaint

A graduate student may file a complaint with the Graduate School when they believe that actions or behaviors governed by this procedure have occurred and when all good faith efforts to resolve their complaint either through direct communication with the individual(s) involved or through applicable procedures in the graduate program, department, school, or college have failed.

To be addressed under this procedure, a complaint must be submitted using the Graduate School Complaint Form.

Categories of complaints to which this procedure applies include, but are not limited to the following:

- Unfair application of policies includes differential application of policies or regulations within a particular degree program or department that is not commensurate with individual differences in skills, contributions, or performance.
- A hostile environment includes personal conflict or behavior within a laboratory, degree program, or department that has the effect of interfering with a person’s performance; Note: A hostile environment claim may be referred to another office for resolution if it arises because a person is a member of a protected class under the University’s harassment policy.
- Unfair decisions related to differential work assignments, allocation of research resources, allocation of financial support, or allocation of authorship that are not commensurate with individual differences in skills, contributions, or performance.
- Interference or intimidation includes actions or behaviors that limit, impede, or delay a person’s completion of a task or degrade the person’s performance in any aspect of the person’s scholarly work.

The complaint form must include:

- A detailed description of the actions or behaviors governed by this procedure giving rise to the complaint, including documentary evidence (e.g., correspondence, notes, descriptions of interactions, and dates of occurrence) supporting the allegation.
- A description of actions already attempted to resolve the complaint (e.g., correspondence with the person(s) against whom the complaint is lodged; records of meetings with graduate program directors, department heads, or deans).
- The names of those lodging the complaint.

Complaints to the Graduate School may not be filed anonymously. Anonymous complaints may be filed through the Workplace Alert Program at: [safeworkplace.uconn.edu](http://safeworkplace.uconn.edu). The Graduate School may or may not become involved in the resolution of these anonymous complaints. If the Graduate School does become involved, it may be unable to resolve the complaint unless the accuser discloses their identity.

The complaint process will follow the guidelines set forth in the Graduate School Hearing Procedure.

Consistent with the University’s Non-Retaliation Policy at: [policy.uconn.edu](http://policy.uconn.edu), retaliation against any person who makes or participates in a complaint under this policy is strictly forbidden.

## Filing an Appeal

A graduate student may file an appeal with the Graduate School when they are in disagreement with actions taken or academic consequences imposed by an individual faculty member, graduate program, department, school, or college and when all good faith efforts to resolve their concern either through direct communication with the individual(s) involved or through applicable procedures in the graduate program, department, school, or college have failed.

An appeal must be filed in writing to the Graduate School using the Graduate School Appeal Form. All materials submitted during the appeal process should be clearly organized and labeled. Appeals will not be reviewed if the information is incomplete.

Categories of actions or academic consequences that an appeal might address includes, but is not limited to, those listed below.

- Academic dismissal
- Termination of status
- Allegation of scholarly misconduct
- Academic consequences imposed by allegation of scholarly misconduct

The Graduate School endorses the process for appealing a final course grade as described in the University Senate By-Laws. Information regarding this process can be found at: [guide.uconn.edu/instruction/challenges-to-a-grade/](http://guide.uconn.edu/instruction/challenges-to-a-grade/).

The Appeal Form must include:

- A detailed description of the actions or academic consequences giving rise to the Appeal, including documentary evidence (e.g., correspondence, notes, descriptions of interactions, and dates of occurrence) supporting the allegation.
- A description of actions already attempted to resolve the concern (e.g., correspondence with the person(s) records of meetings with graduate program directors, department heads, or deans).
- The names of those requesting the Appeal.
- For academic dismissal and termination of status appeal: Provide a description of a plan for removing barriers to successful program completion.

Timeline for filing an Appeal:

1. Submit Appeal Form to the Graduate School within 10 business days of receipt of the notification of the action or academic consequence.
2. The Graduate School will notify the major advisor and graduate program/department of the student's intent to appeal the action or academic consequence within five business days.

The appeal process will follow the guidelines set forth in the Graduate School Hearing Procedure.

Consistent with the University's Non-Retaliation Policy at [policy.uconn.edu](http://policy.uconn.edu), retaliation against any person who makes or participates in an Appeal under this policy is strictly forbidden.

## Graduate Hearing Procedure:

When there is evidence that all good faith efforts to resolve disputes at the "local" level have failed, a complaint or appeal is filed with the Graduate School.

For cases forwarded for the consideration of the Hearing Committee, both parties will be notified of the reason for the hearing and scheduled hearing date. The hearing will be scheduled by the Graduate School no later than 30 business days after notification that a complaint or appeal has been submitted to the Hearing Committee.

For good cause shown, the Hearing Officer may reschedule the hearing at the request of either party. Hearings are not rescheduled based on availability of the support persons or the witnesses. If the complainant fails to appear at the hearing, the issue will be dismissed. If the respondent, the person(s) against whom the complaint or appeal is requested, fails to appear at the hearing,

the Hearing Committee will hear evidence from the complainant and render its finding. A finding that arises from the complainant's or respondent's failure to appear at the hearing may be appealed in writing to the Graduate School, but only on the grounds that extreme circumstances prevented the person's attendance at the hearing. If the request to appeal is accepted, the Hearing Officer will determine a new period within which a hearing must be held, and no further extensions will be granted.

The Hearing Committee is composed of three voting members (two members of the graduate faculty and one graduate student). The Hearing Officer (Associate or Assistant Dean) shall conduct the hearing as a non-voting member. No member of the Hearing Committee may be a member of the program/department of either party to the hearing, nor may any member of the Hearing Committee have personal or professional associations with the parties. Both parties will be notified in writing of the composition of the Hearing Committee at least 10 business days prior to the scheduled hearing, and any objections to the appointment of any committee member on the grounds that the member's participation would jeopardize a fair hearing must be provided to the Graduate School no later than five business days prior to the hearing date. The Hearing Officer will determine whether any objections have merit and make adjustments to the committee membership as appropriate.

The hearing is not a court proceeding and will not be bound by the procedures and rules of evidence of a court of law. The Hearing Committee will determine whether the issue has merit, and will determine the appropriate response if merit is found. The Hearing Committee's decision shall be made by majority vote. The hearing will occur in private and will be audio recorded. The Graduate School will maintain the audio recording as required by Connecticut state law and it is the property of the University. Hearing participants are prohibited from making their own recording. Upon written request, a respondent or complainant may review the audio recording and make appropriate arrangements for it to be transcribed on University premises. Arrangements for a transcriber and all associated cost involved in the transcription will be the responsibility of the requesting individual.

Both the complainant and respondent may each invite one person to attend the hearing as a support person. The support person may be consulted throughout the hearing, but is not permitted to directly participate in the hearing. Either party may invite witnesses to provide directly related information and must submit the names of support persons and witnesses or signed witness statements from witnesses unable to attend the hearing to the Graduate School at least 10 business days in advance of the hearing. Witnesses generally cannot serve as support persons. However, if a witness is also a support person, this person can submit a signed written witness statement prior to the hearing and will not be able to participate in the capacity of a witness during the hearing. The Graduate School will provide a list of all persons expected to be present to the Hearing Committee and both parties at least five business days before the scheduled hearing date.

All documentary evidence to be submitted should be clearly identified and provided to the Graduate School at least 10 business days before the hearing. New evidence will be allowed at the hearing at the sole discretion of the Hearing Officer. The party seeking to introduce new evidence must provide at least five additional copies of evidence for review. In all cases, the evidence must be clearly organized and labeled. The Graduate School will maintain one complete copy of all evidence submitted.

The Hearing Officer will conduct the hearing in accordance with the following procedures:

1. The Hearing Officer will identify the Complainant(s), Respondent(s), all other persons involved in the hearing and the members of the Hearing Committee.
2. The Hearing Officer will state the issue, as set forth in the notification sent to both parties.
3. Each party will be offered the opportunity to make brief opening statements. Each opening statement should consist of a brief

summary and should not involve lengthy discussion or presentation of evidence. The Complainant will present their information first.

4. Each party will be offered opportunity to present evidence to support their position, which may include written statements, personal oral statements, witness oral statements, and physical exhibits. The Complainant will present their information first. Witnesses will be present in the hearing room only during the period in which their statement is provided.
5. The Hearing Committee will be offered the opportunity to question both parties and all witnesses. The Hearing Officer will determine the order in which witnesses will provide their statements.
6. Both parties will have the opportunity to present a closing statement. The Complainant will present their closing statement first. At the conclusion of closing statements, the hearing will conclude and immediately following the hearing the Hearing Committee will privately deliberate and render a decision. The Hearing Committee's decision will specify clearly whether the issue has merit and a recommendation for the appropriate course of action. Both parties will be notified in writing of the Hearing Committee decision within 10 business days.

During the hearing either party:

- May decline to make statements. A refusal to answer questions shall not be interpreted unfavorably with respect to that party's position; and
- May decline to appear at the hearing. The refusal of the respondent(s) shall not be interpreted as evidence that the issue is valid.

The decision will be sent to both parties, the major advisor, the graduate program coordinator and/or department head, the Dean of the school or college in which the issue occurred, and to the Dean of the Graduate School within 10 business days from the date of the hearing. The notice will be sent to all parties via their official University email address, and if appropriate, by first class mail, postage prepaid, to the mailing address on file with the University.

### **Final Appeal Process**

A written appeal can be filed with the Dean of the Graduate School within 10 business days after email notification of the Hearing Committee's decision is sent. An appeal is not a new hearing. It is a review of the record of the original hearing. In order to prepare an appeal, the person filing the final appeal request shall have the right to review the records of the hearing, including the audio recording. This review of records, including the audio recording, is limited to the purpose for preparation of the appeal only.

An appeal may be sought on the following three grounds:

- On a claim of error in the hearing procedure.
- On a claim of new evidence or information material to the case that was not available at the time of the hearing.
- On a claim of substantive error arising from misinterpretation of evidence presented at the hearing.

The Dean of the Graduate School has 30 business days to consider and provide an outcome of the final appeal request. The Dean of the Graduate School approves or denies a final appeal. If a final appeal is approved, the Dean of the Graduate School may determine an appropriate course of action or return the case to the Hearing Committee with instructions to guide additional deliberations.

The decision of the Dean of the Graduate School concerning a final appeal is final.

A version of this policy was first approved and adopted by the Board of Trustees on November 10, 1998. It was amended on April 24, 2013. This version was approved and adopted by the Board of Trustees on March 26, 2014.

# College of Agriculture, Health and Natural Resources

## Agricultural and Resource Economics (Ph.D.)

The Department of Agricultural and Resource Economics offers a Doctor of Philosophy (Ph.D.) in Agricultural and Resource Economics. The Ph.D. program is designed to be completed in four to five years, with the first two years focused on coursework and the final two to three years on research and completion of the dissertation. Due to course sequencing, students are normally only admitted for the fall semester.

### Ph.D. Requirements

Students are required to satisfactorily complete twelve courses: eight core courses in economic theory and quantitative methods, three courses in an area specialization, and one elective.

**Required Courses.** The core courses in economic theory and quantitative methods are: ARE 6311, 6313; ECON 6201, 6202, 6211, 6301, 6310 and 6311. The three courses that define an area of specialization are set in consultation with the student's advisory committee. The elective course must be at the 6000 level in ARE that is not part of the core or area of specialization requirements. Exemptions or substitutions to a particular course requirement based upon courses previously taken in another program of study or alternative courses offered at the University of Connecticut are subject to approval of the Departmental Ph.D. Steering Committee.

**Qualifying examination.** All students enrolled in the Ph.D. program must pass a qualifying examination in applied microeconomics. This examination is based on material presented in the following courses: ARE 6311, 6313; ECON 6201, 6211, and 6310 (or equivalent if the department provides an alternative course as an approved substitute). Unless granted an exemption from the Qualifying Examination Committee, students must take the qualifying examination offered immediately following the completion of the spring semester of their first year. The qualifying examination will occur once per year and students will be given at most two opportunities to pass the examination. Further, unless granted an exemption from the Qualifying Examination Committee, students who fail the qualifying examination must take the first subsequent examination offered. Exemptions will only be granted according to recognized college and university policy.

**Area of Specialization Exam.** Students who have passed the qualifying examinations in applied microeconomics or have obtained an exemption and who have filed an approved Plan of Study with the Graduate School may take this exam. The examination covers course work in the Area of Specialization and related courses. The exam is administered by the student's advisory committee, which is also responsible for its format and scheduling. The exam may be of the traditional type or may take the form of a high quality independent research paper.

**Dissertation Proposal.** Students must successfully defend a proposal that outlines the research constituting their dissertation. Satisfactory completion of the dissertation proposal is determined by the student's advisory committee.

## Animal Science (M.S., Ph.D.)

The Department of Animal Science offers two graduate degrees: Masters of Science (M.S.) and Doctor of Philosophy (Ph.D.). The M.S. degree may be awarded either as a thesis (Plan A) or non-thesis degree (Plan B). The Animal Science department is diverse, with a large variety of student and faculty interests. As a result, each student's program is quite flexible, and is shaped by the student in consultation with their major advisor and Graduate Advisory Committee. Courses elected shall be consistent with the student's objectives and related to the field in which the degree is to be taken. The M.S. degree in Animal Science offers students the opportunity to emphasize study in animal behavior, genetics, regenerative biology, food science, microbiology, nutrition, growth, physiology of lactation, physiology of reproduction, or production management. The Doctor of

Philosophy degree in Animal Science offers several areas of concentration within the Animal Science Field of Study including: Animal Genetics and Regenerative Biology, Growth and Reproductive Physiology, Animal Nutrition, and Food Microbiology and Safety. The Ph.D. degree requires demonstrated capabilities for conducting independent research plus related scholarly attributes.

**Requirements.** The M.S. and the Ph.D. requirements in Animal Science conform to the Graduate School requirements. The Ph.D. in Animal Science has a related area or foreign language requirement. Both degrees have specific course requirements described below. Additional course requirements for the M.S. and Ph.D. in Animal Science are determined by the student's advisory committee consistent with the minimum requirements specified by the Graduate School.

### Plan A (Research/Thesis) M.S. in Animal Science

Students must complete a minimum of 30 credits, of which a minimum of 18 credits must include formal coursework, and a minimum of nine credits must include GRAD 5950 or 5960. The formal coursework cannot include ANSC 5692 or 5699.

**Required Courses.** ANSC 5694 and 5693. The plan of study shall consist largely of courses at the 5000 level or above. No more than six credits of coursework at the 3000 or 4000 level may be counted towards the degree.

**Final Exam and Thesis Defense.** Students must defend their thesis at a public seminar. The defense must be completed no later than one year after completion of coursework or the thesis. Following the presentation, the Advisory Committee will administer a final examination. The format of this examination is at the discretion of the Major Advisor/Advisory Committee, and its purpose is to assess the student's understanding of the area that they have emphasized, their research, and their thesis.

**Publication.** Students must submit at least one first-author manuscript, suitable for publication, to their Major Advisor before defending their thesis. In some circumstances, the Major Advisor, in consultation with the Advisory Committee, may modify or waive this requirement.

### Plan B (Non-thesis) M.S. in Animal Science

Students must complete a minimum of 30 credits, of which a minimum of 24 credits must include formal coursework, and a minimum of four credits must include ANSC 5692 or 5699. The research component of the Plan B program can involve library research, assistance on laboratory-based projects, computer or data analysis, or any form of scholarly activity approved by the Major Advisor and the Advisory Committee.

**Required Courses.** ANSC 5694. No more than six credits of coursework at the 3000 or 4000 level may be counted towards the degree.

### Ph.D. in Animal Science

Each Ph.D. plan of study must include 30 credits of course work beyond the baccalaureate degree or its equivalent, or at least 15 credits beyond the master's degree or other advanced degree in the same or a closely related field of study, not including credits for foreign language or those substituted for foreign language requirements prescribed by the Graduate School.

**Required Courses.** Ph.D. students must complete one credit of ANSC 5693 and two credits of ANSC 5694. Students who have previously completed one credit of ANSC 5693 are exempt from that requirement. Animal Science Ph. D. students must successfully complete at least one related area or demonstrated reading proficiency of at least one appropriate language other than English as prescribed by the Graduate School. In addition to course work, satisfactory completion of at least 15-credits of GRAD 6950 or 6960.

**General Exam.** Ph.D. students must sit for General Exams no later than eight months prior to the Doctoral Dissertation Defense.

**Dissertation Proposal.** Each student must submit a dissertation proposal. The written dissertation proposal must first be approved by the Advisory Committee, then two copies must be submitted to the Department Head at least two weeks in advance of the dissertation proposal defense for external review. A public presentation of the student's research dissertation proposal is to be held prior to final approval. The dissertation proposal should be submitted to the Graduate School for final approval by the time the student has completed the ninth credit of GRAD 6950 or 6960. Approval must occur no later than eight months in advance of the Doctoral Dissertation Defense.

**Final Exam and Doctoral Dissertation Defense.** Students must defend their dissertation at a well-advertised, public seminar. Following the presentation, the Advisory Committee will administer a final examination. The format of this examination is at the discretion of the Major Advisor/Advisory Committee, and its purpose is to assess the student's understanding of the area that they have emphasized, their research, and their dissertation.

**Publication.** Students must submit at least one first-author, full-length manuscript, suitable for publication, to their Major Advisor before defending their dissertation. This requirement does not include reviews, abstracts, or technical papers. In some circumstances, the Major Advisor, in consultation with the Advisory Committee, may modify or waive this requirement.

### Applied and Resource Economics (M.S.)

The Department of Agricultural and Resource Economics offers Master of Science (M.S.) in Applied and Resource Economics, which may be awarded along the way to a Ph.D. or as a terminal degree. The terminal M.S. provides rigorous training in microeconomics and quantitative methods, and their applications to economic and policy issues involving food, health, natural resources, and the environment. Students completing this degree go on to work in the private sector, government agencies, international organizations, or continue on for a Ph.D.

**Requirements.** Students may attain the terminal M.S. degree by pursuing one of three plans of study. Regardless of the plan selected, students must satisfactorily meet the following requirements: complete 30 credits of total coursework; complete 12 credits from ARE or ECON courses at the 5000 level or above (independent study and internship credits cannot be used to satisfy this requirement); take one master's level course in microeconomic theory (ARE 5201 or ECON 5201) and one master's level course in econometrics (ARE 5311). The remaining requirements unique to each plan of study are stated below.

**Plan A (Thesis).** Students must complete nine credits of GRAD 5950 and successfully defend a thesis. The additional required 21 credits may include a maximum of three credits of ARE 5499 or 5991.

**Plan B (Major Paper).** Students must complete three to six credits of ARE 5499 associated with writing the major paper. Public presentation of the major paper is also required. May not exceed 12 credits of ARE 5499 and 5991.

**Plan B (Coursework).** Coursework may include up to 12 credits of ARE 5499 or 5991.

### Athletic Training (M.S.)

The Department of Kinesiology offers a Master of Science in Athletic Training (M.S.A.T.) as well as a Master of Science (M.S.) in Kinesiology (Exercise Science concentration), Doctor of Philosophy (Ph.D.) in Kinesiology (Exercise Science concentration) and a Doctor of Physical Therapy (D.P.T). The Master of Science in Athletic Training (M.S.A.T.) is a professional master's degree program leading to certification as an athletic trainer and clinical practice in a variety of settings including professional, collegiate, and youth athletics, as well as centers supporting the health and well-being of tactical athletes. It is a two year, six semester, post-bachelor program. The first year consists of coursework related to the prevention, evaluation, and treatment of sport-related injuries and conditions, as well as focused clinical education experiences. During the second year, students complete coursework to advance their knowledge in evidence-based athletic training clinical practice while completing two full-time, immersive clinical education experiences. Successful applicants to the M.S.A.T. meet or exceed the Graduate School admission standards and have completed generally "B" average or better prerequisite coursework prior to matriculation. The required courses include: Biology, Chemistry, Physics, Human Physiology and Anatomy I and II, Psychology, Exercise Physiology/Exercise Science, Nutrition, and Statistics. Submission of Graduate Record Examination scores is required.

**Required Courses.** Completion of the Master of Science in Athletic Training degree requires the completion of 79 credits including each of the following courses: KINS 5100, 5101, 5102; four credits of KINS 5103; 5105, 5106, 5107, 5109, 5110, 5111, 5112, 5113, 5200, 5201, 5202, 5203, 10 credits of 5204; 5205, four credits of Research Design and Implementation in Athletic Training; PT 5410, 5412, 5418.

### Energy and Environmental Management (M.S.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources and the College of Liberal Arts and Sciences.*

The Master of Energy and Environmental Management (MEEM) program offers a Master of Science (M.S.) degree through an interdisciplinary partnership involving the Department of Natural Resources and the Environment, Department of Geography, School of Law, and Center for Environmental Sciences and Engineering. The MEEM is designed for college graduates looking for advanced study in energy and environmental management fields, and working professionals looking to enhance their skills and knowledge in science, management, and policy.

**Requirements.** The MEEM requires 27 credits of coursework and three credits of internship or practicum, for a total of 30 credits. The MEEM generally takes 18 to 24 months to complete and conforms to the Graduate School requirements for a Plan B Non-thesis Master Degree.

**Required courses.** LAW 7812; NRE 5200, 5220; and a three-credit Internship or Practicum course. Elective coursework includes 18 credits drawn from the following specialty areas (each of which constitutes a stand-alone graduate certificate program).

**Sustainable Environmental Planning and Management:** NRE 5205, 5200\*, 5210, 5220\*, 5585.

**Geographic Information Systems:** GEOG 5100, 5130, 5230, 5390, 5500, 5505, 5510, 5520, 5530, 5600, 5610, 5810; NRE 4535, 5575.

**Energy and Environmental Law:** LAW 7568, 7600, 7650, 7656, 7721, 7758, 7784, 7805, 7806, 7812\*, 7842.

\*Required courses for the Master of Energy and Environmental Management are listed under electives only for illustrative purposes of content under each graduate certificate program. Required courses will not count towards elective course requirements.

### Genetic Counseling (M.S.) \*

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, and UConn Health.*

The Department of Allied Health Sciences under the umbrella of the College of Agriculture, Health and Natural Resources and the Institute for Systems Genomics offers a Master's Degree in Genetic Counseling. This degree program provides innovative and interprofessional training for tomorrow's leaders in the translation of genomics and precision medicine. With the availability of NextGenCT training facilities on the University of Connecticut campuses, students will learn the technological advances they will later need to understand and interpret for their patients and communities. Skills development in scientific communication, ethical considerations, clinical applications, literature appraisal, and leadership assures graduates are effective, productive, and compassionate professionals. The program is not offered on a part-time basis and includes required summer components. Courses and training take place on the Storrs and Farmington campus and online. Practical training requires travel to external affiliated hospitals, centers and clinics across Connecticut (transportation may be available in some instances).

**Requirements.** Except in special cases, genetic counseling students will complete required coursework and clinical rotations within 24 months. The successful graduate student will have established a three-faculty member Advisory Committee and completed the requisite total number of academic credits predetermined by program administration inclusive of course work, laboratory training, professional development, clinical rotations and a capstone project as outlined in a plan of study. In addition, M.S. in Genetic Counseling candidates will have accumulated sufficient logbook cases for the American Board of Genetic Counseling examination eligibility.

Specific course requirements are determined by both program leadership and the student's advisory committee consistent with requirements specified by the Graduate School. The typical plan of study includes conceptual coursework, laboratory training, professional development and practical coursework (clinical rotation experience). Didactic and practical courses are predetermined by program administration. Electives may be selected from a menu of options in consultation with the students' academic advisor and advisory committee. The plan of study has been designed based on domains needed to gain mastery in the body of knowledge of the field of genetic

counseling. Coursework is selected to assure students can apply knowledge of genetic principles and genomic technologies to improve quality of health-care through the diagnosis, screening, intervention or prevention of disease and the maintenance of health. The exit exam timing and format are determined and designed by the Advisory Committee to reinforce the discipline-specific competency and provide an evaluation tool for relevant problem-solving abilities.

The Genetic Counseling curriculum meets the Accreditation Council for Genetic Counseling (ACGC) requirements in that student training supports the 22 practice-based competencies within four domains: Genetics Expertise and Analysis; Interpersonal, Psychosocial and Counseling Skills; Education; and Professional Development and Practice. A content component common to all health professions lies in both public health and the ethical, legal, social implications of genetics.

\* This program is not accepting applicants at this time.

## Health Care Genetics (M.S.)

Recent milestones in genome-based technologies and genetic research have realized novel approaches to clinical diagnostic testing, health promotion, and individualized health care. The Department of Allied Health Sciences, under the umbrella of the College of Agriculture, Health and Natural Resources and the Institute for Systems Genomics, offers an innovative Professional Science Master's Degree in Health Care Genetics.

A Professional Science Master's Degree in Health Care Genetics is a science degree "plus" experiential and professional development training designed to increase knowledge and prepare leaders in health care genetics who translate discoveries in genetic sciences to products, policies, and practices. A Professional Science Master's Degree is an excellent option for professionals allowing them to pursue cutting-edge, relevant training and excellence in science without a Ph.D., while simultaneously developing highly-valued workplace skills.

**Requirements.** The successful graduate student will have established a three-faculty member Advisory Committee, completed a minimum of at least 33-credits and demonstrated passing performance on an exit examination. The typical plan of study includes 17 credits of conceptual coursework, eight credits of practical coursework (laboratory or research experience) and eight credits of professional master's cohort courses, including an internship. Didactic, practical and professional cohort courses are selected from a menu of classes in consultation with the students' academic advisor and advisory committee. The plan of study will be designed and individualized based on a student's prior experience, career goals and those needed to gain mastery of the body of knowledge of the field. Coursework is selected to assure students can apply knowledge of genetic principles and genomic technologies to improve quality of health-care through the diagnosis, screening, intervention or prevention of disease and the maintenance of health. Laboratory training provides hands-on experience and case analyses in basic molecular biology techniques, chromosome testing, and next generation technologies. Skills development in scientific communication, ethical considerations, laboratory regulations, literature appraisal, and leadership assures graduates are effective, productive, and compassionate professionals. There is no specific required sequence of courses, unless a course has a specific pre-requisite course indicated in the course description. The Program may be completed on a part-time basis, does not include required summer components with the exception of directed study/internship that may be scheduled during the summer months. The final requirement for the Professional Science Master's Degree is passing performance on an exit exam, the format of which may include, but is not limited to, a written and/or oral scholarly piece of work. The exit exam timing and format are determined and designed by the Advisory Committee and internship supervisory personnel to reinforce the discipline-specific competency and provide an evaluation tool for relevant problem-solving abilities.

## Health Promotion Sciences (M.S., Ph.D.)

The Graduate Program in Allied Health (G.P.A.H.) offers two graduate degrees in health promotion sciences: Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) in Health Promotion Sciences. Graduates of our programs acquire the knowledge and skills to advance our understanding of the role of behavioral, social, and environmental influences in chronic

diseases and conditions and to apply the principles and practices of health promotion and health behavior change to create innovative solutions for current and emerging health challenges. The graduates of the M.S. program are employed in public health, community-based treatment and health care, worksite, and research settings. The graduates of the Ph.D. program are trained in more research-focused careers in academic settings but could also be leaders in a variety of professional settings, including industry, public health, work-site, and non-profit settings. The graduate programs offer students competitive graduate research and teaching assistantships, individualized programs of study, and opportunities for expanded roles in health promotion, health care, and research. Courses included on the approved program of study must achieve a grade of "B-" or higher. Students must maintain an overall grade point average (GPA) of 3.0 per term to be in good standing. In addition to the Graduate School requirements, the graduate programs in Health Promotion Sciences have the following requirements listed below.

### M.S. in Health Promotion Sciences

May be earned under either of two plans. Both meet the minimum requirement of 30 credits completed. Plan A (Thesis track) emphasizes research and requires at least 24 credits of advanced course work and completion of a master's thesis. Plan B (Project and Practicum Track) requires a comprehensive understanding of the subject matter, at least 26 credits of advanced course work, and completion of a project and a practicum. Students in both plans work with their major advisor to assemble a graduate advisory committee and develop the plan of study and research agenda culminating in the writing and oral defense of a thesis (Plan A) or in the project/practicum (Plan B). Students must satisfy the University standards and degree requirements, and pass a comprehensive examination administered under the auspices of the advisory committee.

**Requirements:** The plan of study includes courses in the following two domains.

**Health Promotion:** AH 5319, 6305, and 6324, totaling nine credits.

**Research:** AH 5005, 6005, and 6306, totaling nine credits.

Elective courses from Allied Health Sciences and other schools or colleges across campus are used to develop depth in an area of health promotion sciences (e.g., statistical modeling/evidence-analysis, behavioral and environment change interventions, genetics and diagnostics).

### Ph.D. in Health Promotion Sciences

A four-year advanced, applied and research-oriented degree based on synergy between major areas - behavioral and environmental change interventions, diet and physical activity across the lifespan, genetics/diagnostics and statistical modeling sciences—to promote health and prevent diseases in a variety of settings and for diverse individuals. Doctoral students normally enter in the fall semester.

**Requirements:** A minimum of 48 credits in the following domains.

**Health Promotion Core:** AH 5700, 6181, 6305, 6324, and 6421, totaling 15 credits.

**Methodology and Statistics:** AH 5005, 6005, and 6306, totaling nine credits.

### Cognate Courses Supportive of Knowledge/Skills and Dissertation Research

**Research:** Elective courses from Allied Health Sciences and other schools or colleges across campus are selected to develop depth in an area of health promotion sciences related to the student's dissertation research (e.g., statistical modeling/evidence-analysis, behavioral and environment change interventions, genetics and diagnostics), totaling nine credits.

**Developing Research and Academic Teaching Skills and Competence:** AH 6184, and 6422, totaling six credits.

The student and their doctoral committee jointly determine the specific program of doctoral study in health promotion science. This process allows for designing plans of study uniquely suited to each person's particular needs and career goals.

**Doctoral General Exam/Dissertation.** The goal of the general examination is to assure that all students have acquired and can effectively communicate the breadth and depth of the field. The general examination contains a written component and oral examination of the written component as well as the dissertation proposal and oral defense of the dissertation proposal. The dissertation proposal is reviewed by an expert in the field external to the University.

## Kinesiology (M.S., Ph.D.)

The Department of Kinesiology offers a Master of Science (M.S.) and a Doctor of Philosophy (Ph.D.) in Kinesiology with a concentration in Exercise Science, as well as a M.S. in Athletic Training and a Doctor of Physical Therapy (D.P.T.). The M.S. is a research-based master's degree aimed at students pursuing careers in exercise and sport science, clinical exercise physiology, or, with additional training, academia and research. The Ph.D. prepares students for research and teaching careers in exercise science, including research and leadership positions with academic, corporate, community and government organizations.

**Requirements:** These academic degree programs follow the Graduate School requirements outlined in the Academic Regulations section of this catalog for completion of M.S. and Ph.D. degrees. The Master of Science is a thesis degree program.

## Materials Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science offers programs leading to Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in the area of Material Science. All programs include training in synthesis, characterization, and applications of materials, and give students sufficient flexibility to pursue their special interests as well as time to take courses in other departments at the University of Connecticut.

### M.S. in Materials Science

The program normally requires 31 credits. While it is possible to complete the M.S. degree within a year, most students will need three to four semesters. The courses of the program cover courses concerning synthesis, characterization, and applications of materials. The plan of study for the M.S. degree may be formulated with related work in almost any area, e.g., Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. Students are encouraged to participate in research projects done by members of the department.

**Requirements.** There are no specific required courses. All students must choose a committee for the M.S. degree and that committee must approve all courses. Typical courses are any of the 5000 series courses in Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. The final requirement is passing the Master's Exam which has two parts. One is a written test concerning basic understanding of course materials. The second requirement is a final oral exam which includes course work, and any research done by the student. For a course work master's degree there is no thesis requirement. For a research based Master's degree, there is a requirement of a Master's thesis. All students are encouraged to follow the research degree route. In order to be considered for a possible switch to the Ph.D. program or for financial support, a student with an M.S. degree in Materials Science or someone showing great promise during the M.S. program needs to apply to the Ph.D. Program.

### Ph.D. Program in Material Science

Emphasizes development of the ability to generate novel research results in Materials Science. Individuals with a Bachelor's degree in any major, with an interest in Materials Science are encouraged to apply. The course work typically consists of at least 16 graduate level courses that cover a wide range of topics, including Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. After completing the necessary course work and a sequence of examinations, a Ph.D. candidate must complete a dissertation that makes an original contribution to the field of Materials Science.

**Requirements.** For students entering the program after a Bachelor's Degree, typically 16 to 18 courses are required. An individual plan of study is developed by the student and their Advisory Committee. Courses in the following departments are considered: Biology, Chemistry, Physics,

Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. In general, Ph.D. students must take graduate level courses that are approved by the major advisor of a student, as well as the student's advisory committee. The materials science program has no requirement on foreign languages.

The first formal requirement for the Ph.D. degree is passing the General Examination. The general examination consists of a written exam which is an original proposal. If the student passes the written exam, they are then asked to prepare for an oral examination. The oral exam consists of any aspect of course work, the written exam questions, and the proposal, research progress, or combinations of these. The preparation of a dissertation then follows, where the student must present an original contribution to the general area of Material Science. The final requirement is a defense of the Ph.D. dissertation before the Ph.D. Advisory Committee, students and anyone else interested in attending. The exam consists of a presentation by the student, questions of the students and audience, and then a closed session of questions from the Advisory Committee.

## Natural Resources: Land, Water, and Air (M.S., Ph.D.)

The Department of Natural Resources and the Environment offers two graduate degrees in Natural Resources: Land, Water, and Air, Doctor of Philosophy (Ph.D.) and Master of Science (M.S.). The Department offers advanced study in the following areas: Conservation and Management of Forests, Wetlands, Fisheries and Wildlife, Climate, and Water Resources; Ecosystem Science and Management; Geospatial Analysis such as Remote Sensing of the Environment/GIS; Landscape Ecology; and Human Dimensions of Natural Resources. The purpose of the M.S. program is to provide advanced study. The M.S. degree may be awarded as Plan A or Plan B. The Plan A M.S. is a research-based master's degree whereas the Plan B M.S. is a coursework-based master's degree. The M.S. program prepares students for Ph.D. programs (Plan A) or for careers in natural resources science and management with local, state, and federal government agencies, environmental consulting firms, or non-profit organizations (Plan A and Plan B). The Ph.D. program is designed to educate scientists with a broad experience in natural resources and to prepare them to do independent research. The Ph.D. program prepares students for careers in research and teaching in natural resources, including academia, non-profit organizations, industry, and government. Full-time students are expected to complete their Ph.D. degree work in three to five years and part-time students in five to seven years.

**Requirements.** The Plans of Study for Ph.D. and M.S. students in Natural Resources are determined by the student's advisory committee consistent with the minimum requirements specified by the Graduate School in addition to departmental guidelines and requirements described below.

### Master of Science

Students can pursue an M.S. degree by either of two plans as determined by their advisory committee. Plan A requires a written thesis that summarizes findings from an independent research project and a final oral examination. Plan A conforms to the Graduate School requirements for a Thesis Master's Degree. Plan B requires a final examination but no thesis. Plan B conforms to the Graduate School requirements for a Non-thesis Master's Degree. Both M.S. degree plans require 30-credits following the Graduate School guidelines.

### Doctor of Philosophy

Ph.D. students are required to successfully complete NRE 5800, 6000; and any additional course work as approved by the candidate's advisory committee as part of the Plan of Study.

## Nutritional Sciences (M.S., Ph.D.)

The Department of Nutritional Sciences offers Master of Science and Doctor of Philosophy degrees. Students elect to emphasize one of three overlapping areas in human nutrition: Molecular Nutrition, Metabolism, and Community Nutrition. Each emphasis area is interdisciplinary in approach and is supported by a broad range of local, national, and international collaborations. The Master's program usually requires a thesis and the Ph.D. program requires a dissertation.

### Master of Science

There are two options for the Master's degree Program: Plan A (thesis option) and Plan B (non-thesis option). All M.S. students are required to take a minimum of 30 credits.

**Requirements:** GRAD 5910; NUSC 5100, 5200, 5300, 5394; three credits of statistics, and three additional graduate credits in the Department of Nutritional Sciences constitute the core requirements. A minimum of 21 course credits is required for the thesis option, in addition to nine thesis credits. Students earning the Master of Science degree are required to complete an examination process that consists of two parts. Part one is a written general knowledge examination with a closed book. Part two is an oral presentation and defense of the thesis research.

### Doctor of Philosophy

All Ph.D. students are required to take GRAD 5910; NUSC 5100, 5200, 5300; two credits of NUSC 5394; six credits of statistics, and a minimum of six additional credits of courses offered by the Department of Nutritional Sciences plus 15 credits of research for the dissertation (GRAD 6950). In addition to the requirements listed in the Graduate Catalog, Ph.D. students in Nutritional Sciences are expected to present a seminar on a topic close to their area of research to the whole department. Before the defense of the prospectus, Ph.D. students are required to take the pre-doctoral examination. Once the written exam is completed, the oral examination follows. During the oral examination the student will be asked questions that cover multiple areas of nutrient metabolism, physiology and other nutrition-related topics that the advisory committee finds pertinent. The exam generally takes no more than two hours.

### Pathobiology (M.S., Ph.D.)

The Department of Pathobiology offers two graduate degrees: Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) in Pathobiology, with areas of concentrations in Bacteriology, Virology, and Pathology, as well as an M.S. degree in Pathobiology with an area of concentration in Veterinary Anatomic Pathology. Faculty research focuses on infectious diseases of animals and humans, vaccines, veterinary pathology, and wildlife diseases. Many faculty are members of the Center of Excellence for Vaccine Research (CEVR), which provides a unifying consortium for vaccine research at the University of Connecticut. The department also provides service to the University and citizens of the State of Connecticut through integration with the Connecticut Veterinary Medical Diagnostic Laboratory. The Veterinary Anatomic Pathology M.S. program is open only to students with the D.V.M./V.M.D. degree.

### Master of Science

For the areas of concentration in Bacteriology, Pathology, and Virology, students can follow either Plan A (thesis) or Plan B (non-thesis) options. For the Plan A, Master of Science degree, 21 credits of coursework and nine credits of GRAD 5950 or 5960 are required. For the Plan B, Master of Science degree, 30 credits of coursework followed by a comprehensive exam are required. All courses used to meet the degree and concentration requirements must be approved by the student's major advisor. For the M.S. degree with an area of concentration in veterinary anatomic pathology, students must take the following courses: PVS 5300, 5303, 5392, 5394, and 5594.

### Doctor of Philosophy

For all areas of concentration, a total of 30 credits of coursework are required. All courses used to meet the degree and concentration requirements must be approved by the student's major advisor. In addition, students will give at least three seminar presentations during their tenure (prospectus seminar, near midpoint of their research and dissertation defense). The General Exam should be taken within one semester after completing course work. A Dissertation Proposal is to be written in the form of an NIH grant proposal and presented in the form of a seminar. This is to be completed within six months of passing the general exam. Students must at a minimum have one first author publication before completion of their degree. The student must present at research seminars once per year.

### Physical Therapy (D.P.T.)

The Department of Kinesiology offers a Doctor of Physical Therapy (D.P.T.) as well as a Master of Science in Athletic Training (M.S.A.T.), Master of Science (M.S.) in Kinesiology (Exercise Science concentration) and Doctor of Philosophy (Ph.D.) in Kinesiology (Exercise Science concentration). The Doctor of Physical Therapy is a professional doctorate leading to licensure as a physical therapist and practice in hospital, rehabilitation, outpatient and community-based care settings to provide care to patients with neurological and musculoskeletal disorders across the life span. It is a three-year, eight semester, post-bachelor's program that prepares physical therapists who are well-equipped for contemporary practice and career-long learning to assure patient benefit from advances in healthcare. The first year consists of coursework in basic and clinical sciences, as well as health care practices. During the second through fourth semesters, students participate in clinical experiences that are integrated into the curriculum. During the third year, students complete three, full-time, off-campus, clinical practicums. Successful applicants to the D.P.T program meet or exceed the University of Connecticut Graduate School admission standards and have completed (generally "B" average or better) the prerequisite coursework prior to matriculation. The required courses include: Biology, General Chemistry I and II, Pre-Calculus or higher, General Physics I and II, Human Physiology and Anatomy I and II, Psychology (six credits), and Statistics. Submission of Graduate Record Examination scores is required.

**Required courses:** Completion of the Doctor of Physical Therapy degree requires the completion of each of the following courses and one, three-credit elective, approved by the Program Director (for a total of 121 credits): PT 5410, 5412, 5414, 5416, 5418, 5420, 5422, 5424, 5430, 5431, 5432, 5433, 5434, 5437, 5438, 5440, 5446, 5448, 5450, 5451, 5452, 5453, 5454, 5455, 5456, 5458, 5460, 5461, 5462, 5463, 5464, 5465, 5466, 5467, 5469, 5480, and 5481.

### Plant Science (M.S., Ph.D.)

The Department of Plant Science and Landscape Architecture offers two graduate degrees: Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). The M.S. degree may be awarded in Landscape Architecture. The M.S. and Ph.D. degrees may be awarded in the Plant and Soil Sciences, including Agronomy, Horticulture, Plant Breeding, Plant Environment, Soil Science, and Soil Chemistry.

**Requirements.** In addition to the Graduate School requirements outlined in the Academic Regulations section of this catalog, the graduate programs in Plant Science have the following requirements: one PLSC 5897 seminar course for the M.S. and two PLSC 5897 seminar courses for the Ph.D. One oral or poster presentation at a national or international professional meeting in your field of study may substitute for one PLSC 5897 seminar course requirement for Ph.D. degrees.

### Polymer Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science Polymer Program serves as the sole center in the State of Connecticut for graduate research and education programs focusing on polymer science and engineering. The program is a nationally and internationally recognized center of excellence for interdisciplinary research and education in the fields of polymer science and engineering. The program is dedicated to meeting the educational needs of its graduate and professional students; providing lifelong learning opportunities in the study of polymeric materials; to assisting Connecticut industry in developing polymer technology; and to expanding and disseminating the global knowledge base regarding polymeric materials.

### Master of Science Program

Other than the GRE General Test scores, there are no special requirements for admission to the master's program beyond those of the Graduate School. Selection of Plan A (thesis) or Plan B (non-thesis) is made after consultation with the Advisory Committee. For Plan A, the student must successfully complete no fewer than 21 credit hours and no fewer than nine additional credits of Master's Thesis Research by taking GRAD 5950 or 5960, as well as the writing an oral defense of a thesis. For Plan B, the student must

successfully complete no fewer than 30 credits of advanced course work and a comprehensive final examination, but no thesis is required.

### Doctor of Philosophy Program

Admission to the doctoral program is based upon a careful assessment of the student's potential for creative research in polymer science. There are no special requirements for the doctoral program beyond those of the Graduate School, other than the GRE General Test scores.

**Requirements:** No fewer than 30 credit hours of advanced coursework, including POLY 5352, 5380, 5381, 5382, 5384, 6001; GRAD 6950 for at least 15 additional credits of Doctoral Dissertation Research. The General Exam, which consists of two parts: a written portion and an oral portion. The written portion is a comprehensive cumulative four-part exam. The oral portion is the writing and oral defense of a dissertation proposal. The Doctoral Dissertation, which consists of two parts: a written dissertation, and an oral defense of the dissertation before a committee of faculty and the general public.

## Systems Genomics (Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, and UConn Health.*

The Institute for Systems Genomics offers a Doctor of Philosophy (Ph.D.) in Systems Genomics.\* A Ph.D. in Systems Genomics trains students to take leadership roles in basic research, clinical research, program management and consultation at the Ph.D. level in the areas of Genome Sciences and Personalized Genomic Medicine. Systems Genomics students will receive specialized training in one or more of the areas listed below.

**Integrated Life Sciences.** Mechanisms of inheritance; genetics and genomics of human disease; stem cell biology; molecular biology including genomic technology; neurobiology and behavioral genetics and genomics.

**Integrated Mathematics, Statistics and Computer Science.** Computational methods in systems biology; bioinformatics analysis of high-throughput data; such as Next-Generation Sequencing (NGS) or mass spectrometry data; facility with data bases relevant to systems genomics and network biology.

**Integrated Personalized Health Care and Ethical, Legal and Social Implications (ELSI).** Interdisciplinary competency in human genomic diagnostics, laboratory diagnostics, health care ethics, and regulatory issues in the clinical laboratory.

### Requirements for Ph.D. in Systems Genomics

Except in special cases, Ph.D. candidates will complete required coursework within the first two years of enrollment in the program. The first year of coursework will focus on "Foundations of Systems Genomics." The second year will focus on "Advanced Topics in Systems Genomics." Specific course requirements are determined by the student's Advisory Committee consistent with the minimum requirements specified by the Graduate School. The Ph.D. in Systems Genomics does not have a related area or foreign language requirement, unless one is specified by the Advisory Committee.

\* This program is not accepting new applicants at this time.

# School of Business

The School of Business offers six graduate degrees: Doctor of Philosophy (Ph.D.), Master of Business Administration (M.B.A.), Master of Science in Accounting, Master of Science in Business Analytics and Project Management, Master of Science in Financial Risk Management, and Master of Science in Human Resource Management. The full-time and part-time M.B.A. programs offer dual degrees that allow students to work jointly toward two University of Connecticut graduate degrees. All students must be independently accepted into both graduate programs. To complete the M.B.A. portion of a dual degree program, students must complete 42 credits including all required courses. Dual degrees are available with the following programs: Master of Science in Business Analytics and Project Management, Master of Science in Financial Risk Management, Master of Science in Human Resource Management, Doctor of Medicine in Dentistry (D.M.D.), Master of Engineering (M.Eng.) – only available with the part-time M.B.A. program, Master of Arts in International Studies, Juris Doctor (J.D.), Medical Doctor (M.D.), Pharmacy Doctor (PharmD.), Master of Social Work (M.S.W.), Ph.D. in Biomedical Science – only available with the part-time M.B.A. program.

## Accounting (M.S.)

The Master of Science (M.S.) in Accounting program is designed to provide students with the skill set critical to a successful professional career in public and private accounting. Qualified students can meet the 150-hour educational requirements to sit for the C.P.A. (Certified Public Accountant) exam in most states. The program may be completed on a part-time or full-time basis. Students must complete 30 credits to fulfill all degree requirements. Three credits must be taken in-residence during a one-week period, while the remaining 27 credits are completed online asynchronously. The graduate certificate in Accounting Analytics is also available to M.S. in Accounting students.

**Required Courses:** ACCT 5505; plus one of the following: ACCT 5531, 5532, 5533, or 5571.

**Approved Electives:** (24 credits required) ACCT 5122, 5124, 5243, 5260, 5531, 5532, 5533, 5535, 5543, 5545, 5546, 5549, 5553, 5554, 5555, 5557, 5559, 5563, 5571, 5575, 5582, 5583 and 5894.

## Business Administration (M.B.A., Ph.D.)

Students must meet the Graduate School requirements, as well as the following requirements to complete graduate programs in the School of Business.

### Ph.D. in Business Administration

Prepares students to conduct high quality, state-of-the-art research and to take faculty positions at leading universities. Areas of study include Accounting, Finance, Management, Marketing, or Operations and Information Management. This is a full-time program with an average completion time of five years. Doctoral students are required to successfully complete between 37 and 49 credits of coursework, depending on their concentration (Accounting, Finance, Management, Marketing, or Operations and Information Management). Coursework spans three broad categories: Research Methods, Major Area of Concentration, and Supporting Courses. Students must maintain a minimum GPA of 3.0, and also complete a qualifying research paper, pass a general examination in their area of concentration, complete a minimum of 15 credits of GRAD 6950 (Dissertation Research), and successfully complete a dissertation.

### Master of Business Administration (M.B.A.)

The M.B.A. program prepares students for general management positions. Prospective students may choose between: the full-time M.B.A. program, which is designed for students with prior work experience seeking to change careers; the part-time M.B.A. program, which is designed with flexibility for currently employed students to follow a self-paced schedule of evening and weekend courses; and the Executive M.B.A. program, which is designed for mid- to senior-level managers to complete degree requirements on weekends as part of a lockstep cohort.

**Executive M.B.A.**

Students must have prior managerial experience, and complete 48 credits as part of a lockstep cohort over 21 months. Students may elect to complete an additional 12 credits to earn a graduate certificate.

**Executive M.B.A. Required Courses:** EMBA 5001, 5111, 5161, 5191, 5212, 5231, 5281, 5301, 5321, 5332, 5413, 5462, 5471, 5514, 5541, 5582, 5602; EMBA 5603 for three credits; EMBA 5651, 5683, 5722, 5772, 5792, 5842, 5852, 5863; EMBA 5901 for three credits; EMBA 5933, and 5993.

**Full-time M.B.A.**

Full-time M.B.A. students must complete 57 credits and a required Experiential Learning milestone over two academic years. The curriculum includes 36 required credits and 21 elective credits. STEM-designated concentrations are available in financial analysis and investments, business analytics, and digital marketing strategy. A fourth concentration in general business is also available.

**Experiential Learning Requirement.** All full-time M.B.A. students must complete an experiential learning milestone. This requirement can be met by completing a course for credit with one of UConn's Accelerators, a paid or unpaid internship or co-op, or an individual or group student project course, which can include student start-ups. It is up to the student, with guidance from faculty and staff, to propose to the M.B.A. Program Director how this milestone will be met, to obtain approval, and to complete it prior to graduation.

**Required Courses:** ACCT 5121 (or both ACCT 5181 and 5182); ACCT 5123 (or both ACCT 5183 and 5184); BADM 5170; BADM 5180 or OPIM 5603; BADM 5181, 5182, 5183, 5190; BLAW 5175 (or both BLAW 5181 and 5182); FNCE 5101 (or both FNCE 5181 and 5182); MGMT 5138 (or both MGMT 5182 and MGMT 5183); MGMT 5800 (or both MGMT 5181 and 5184); MKTG 5115 (or both MKTG 5181 and 5182); OPIM 5110 (or both OPIM 5183 and 5184); OPIM 5181 or 5603; OPIM 5182 or 5165.

**Elective Requirements.** All full-time M.B.A. students must take at least 21 credits of graduate level elective courses. One of the elective courses must be a graduate (5000 level or above) MGMT course, and cannot be MGMT 5138 or 5800. If students have not reached the 21 credit threshold after completing the required graduate MGMT elective and the required courses for their concentration of interest (described below), they can take any other graduate business course to complete their degree.

**Concentrations.** Full-time M.B.A. students must complete one of the following concentrations: Business Analytics, Digital Marketing Strategy, Financial Analysis and Investments, or General Business.

**Business Analytics:** Required courses totaling 12 credits: OPIM 5272, 5603, and 5604; one additional three-credit OPIM elective from the following list: OPIM 5501, 5502, 5504, 5505, 5641, 5671, or an approved OPIM 5894 course.

**Digital Marketing Strategy:** Required courses totaling 12 credits: MKTG 5251, and 5665; two additional three-credit MKTG electives from the following list: MKTG 5220, 5230, 5250, 5640, 5650, or 5655.

**Financial Analysis and Investments:** Required courses totaling 12 credits: FNCE 5202, 5504 and 5512; one additional three-credit FNCE elective from the following list: FNCE 5205, 5209, 5408, 5532, 5533, 5534, 5409, or an approved FNCE 5894 course.

In addition to the courses listed above for the Financial Analysis and Investments area of concentration, full-time M.B.A. students with this concentration may take the following additional courses to complete one of the following specialties.

**Real Estate Specialty.** Approved courses to total nine credits: FNCE 5532, 5533, 5534 or 5894; or a three credit Special Topic or other approved course focused on real estate approved by the Finance Department Head.

**Healthcare Finance and Insurance Specialty.** Approved courses to total nine credits: HCMI 5240, 5243, 5894 or 5686; or other HCMI course focused on healthcare finance and insurance approved by the Finance Department Head.

**Portfolio Management Specialty.** Approved courses to total 12 credits: BADM 5350, 5351; FNCE 5408; and one additional three-credit FNCE elective from the following list: FNCE 5205, 5209, 5409 or 5894.

**General Business:** Students complete 21 credits of any graduate Business course beyond the required core courses in which they are eligible to enroll.

Students must meet the experiential learning milestone requirement and take at least one graduate (5000 level and above) MGMT elective (excluding MGMT 5138 and 5800).

**Part-time M.B.A.**

Students complete 57 credits at their own pace, which averages three years to completion. The curriculum includes 36 credits in required courses and 21 elective credits. Concentrations are available in business analytics, finance, health care management, international business, management, digital marketing strategy, and real estate.

**Required Courses:** ACCT 5121, 5123; BADM 5103; BLAW 5175; FNCE 5101, 5151; MGMT 5138, 5650, 5800; MKTG 5115; OPIM 5110 and 5165.

**Elective Requirements.** Students complete 21 credits of graduate level elective courses. One of the elective courses must be an international business course. International business courses are any elective business courses with a 5000 level designation or higher with "international" or "global" in the title.

**Concentrations.** Part-time M.B.A. students may take electives in any of the following areas to develop a concentration. Students must take the requisite number of credits listed below to fulfill each concentration.

**Management:** 12 elective credits of graduate (5000 level and above) MGMT courses.

**Finance:** 12 elective credits of graduate (5000 level and above) FNCE courses.

**Business Analytics:** 12 elective credits of graduate (5000 level and above) courses.

**Real Estate:** nine elective credits of graduate (5000 level and above) FNCE courses with real estate designations in the titles.

**International Business:** nine elective credits of graduate (5000 level and above) courses with "international" or "global business" in the titles.

The following Part-time M.B.A. concentration requires a specific set of courses.

**Digital Marketing Strategy:** MKTG 5251, 5665, and two additional 5000-level MKTG electives totaling 12 credits.

## Business Analytics and Project Management (M.S.)

The Master of Science in Business Analytics and Project Management (MSBAPM) is designed to meet the growing demand for professionals who can harness advanced business analytics and project management skills to address existing business problems and create new opportunities for small to global enterprises in information-rich environments. Students must complete 37 credits to fulfill all degree requirements. The program features hybrid course delivery that combines face-to-face and online sessions, and can be completed on a full-time or part-time basis. The curriculum is aligned with professional examinations leading to certification and accreditation by the SAS Institute and the Project Management Institute.

**Required Courses:** MGMT 5620; OPIM 5270, 5272, 5601, 5603, 5604, 5641, 5668, 5671 and 5770, totaling 28 credits.

**Approved Electives:** (nine credits required) OPIM 5500, 5501, 5502, 5505, 5507, 5894; or approved graduate level (5000 or above) MKTG, MGMT, or FNCE courses.

**4+1 Analytics Track.** Prospective undergraduate UConn students must apply to the 4+1 Analytics track through the regular Graduate School admissions process during the Fall semester of their junior year. Students who meet conditional acceptance requirements, will be admitted to the 4+1 track if they also successfully complete their UConn undergraduate degree while maintaining the minimum cumulative GPA for admission to the UConn Graduate School, and receive a grade of "B" or better in both courses in one of the following sequences: OPIM 5270 and 5603; or OPIM 5603 and 5604. Students must also fulfill the Technical Communications foundational knowledge requirement by earning a Bachelor's degree with an Affiliated Major or Minor, or "B" or better in OPIM 5601, or an engineering Senior Design course, or other relevant coursework subject to MSBAPM Director approval.

To complete the MSBAPM degree, students admitted to the 4+1 Analytics Track are required to complete 30 credit hours, having completed seven of the required credits to attain admission to the MSBPAM program.

## Financial Risk Management (M.S.)

The Master of Science in Financial Risk Management (MSFRM) degree prepares students to develop and direct investment strategies and manage the financial risk of firms, institutions, and private clients. Many students completing the MSFRM degree program look for positions in finance or risk management upon graduation. Students may elect to continue their studies and complete the Concentration in Quantitative Methods in Risk Management (QRM). Some graduates choose to pursue a Ph.D. in areas such as finance, mathematics or economics. The optional concentration in QRM is coursework-based and provides deeper training in programming and financial modelling with computer and software applications. Students must complete a minimum of 33-36 credits. The program may be completed part-time or full-time. Students must complete an Experiential Learning Requirement prior to graduating.

**Required courses:** FNCE 5310\*, 5312, 5313, 5321, 5322, 5332, 5343, 5331, 5323, 5341, 5333, and 5344.

\* This course can be waived by the Program Director for students who can demonstrate a sufficient understanding of the relevant U.S. financial markets.

**Experiential Learning Requirement.** Students are required to complete an Experiential Learning Requirement (ELR). The ELR is graded as part of FNCE 5344.

**4+1 track.** Undergraduate students enrolled in Finance or other related majors (including other business majors, Economics, Actuarial Science, and Mathematics) may apply for the 4+1 track during their junior year. Students must go through a competitive admissions process, and if accepted into the 4+1 track, will have a plan of study that exempts FNCE 5333. This allows 4+1 track students to complete the MSFRM program with 30 credit hours of graduate work within one additional year of study after completing their undergraduate degree.

**Concentration in Quantitative Methods in Risk Management (QRM).** The concentration in QRM requires students to complete an additional nine credits beyond the requirements for an FRM degree. The Concentration includes two courses on advanced and quantitative applications in Financial Modelling and Financial Engineering and a comprehensive course on Enterprise Risk Management (ERM). The following courses are required to complete the concentration: FNCE 5351, 5352, and 5353.

## Human Resource Management (M.S.)

The Master of Science in Human Resource Management (MSHRM) is designed to build the skills needed for Human Resource leaders. This part-time program is offered in a distinctive format that combines the best of on-campus and online learning enabling students to focus on one course at a time and complete the degree in 22 months. Students must complete 33 credits to fulfill all degree requirements; 27 of these credits are required core courses and six credits are electives. The program is designated as a preferred provider by the Society of Human Resource Managers.

**Required Courses:** MGMT 5138, 5377, 5401, 5650, 5672, 5675, 5676, 5680, and 5805, totaling 27 credits.

**Elective Courses:** Six additional credits offered by the School of Business at the graduate level (i.e., course numbers of 5000 or higher in ACCT, BADM, FNCE, MGMT, MKTG, or OPIM).

# School of Engineering

## Advanced Manufacturing for Energy Systems (M.S.)

The Master of Science (M.S.) in Advanced Manufacturing for Energy Systems prepares students in theory, research and applications of advanced manufacturing for energy specific disciplines. It requires students to complete 21 credit hours of coursework, nine credit hours of thesis research, and a M.S. thesis. Students choose from one of three areas of concentration: Advanced Materials, Processing, or Systems and Controls.

**Core Requirements.** All students are required to complete a three credit course in engineering analysis, a three credit course in computer aided engineering, and a three credit course in engineering communication, to be determined by the program director. Students are required to choose one of the following concentrations: Advanced Materials, Processing, or Sensing and Controls, and complete two core courses (six credits) corresponding to the chosen area of concentration.

**Advanced Materials Requirements:** MSE 5001 and 5332.

**Processing Requirements:** ME 5130 or CHEG 5311; and CHEG 5321.

**Sensing and Controls Requirements:** A three credit introductory course in energy management in manufacturing and a three credit introductory course in smart and green manufacturing.

**Elective Requirement:** A minimum of two elective courses (six credits) from the list of elective courses for each area of concentration.

**Research Requirement:** Nine credits of GRAD 5950, as stipulated in the Graduate Catalog (Plan A).

## Biomedical Engineering (M.S., Ph.D.)

The Department of Biomedical Engineering offers degree programs leading to a Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Upon entering the Ph.D. or M.S. program in Biomedical Engineering students are required to select their area of study or track in one of the following specialties: Biomaterials, Biomechanics, Biomedical Imaging and Biosensors, Bioinformatics and Systems Genomics, and Neuroengineering. Course requirements for the M.S. and Ph.D. in Biomedical Engineering are determined in conjunction with the major advisor and advisory committee. Courses are selected from a track specific list of approved courses maintained on the Biomedical Engineering website. In addition to the standard M.S. and Ph.D. programs, the department also offers a path to the M.S. degree in Biomedical Engineering through a program tied to the Clinical Engineering Internship. This program has separate degree requirements, which include participation in a two-year off-site hospital based internship intended to train students to apply engineering skills to manage healthcare technology in the hospital environment. This program has a separate application process from the standard M.S. in Biomedical Engineering program.

### M.S. in Biomedical Engineering

The standard M.S. degree in Biomedical Engineering may be earned under either of two plans, as determined by the advisory committee. Plan A (thesis option) emphasizes problem-solving through research, while Plan B (non-thesis option) requires comprehensive understanding of a more general character through Biomedical Engineering coursework. In either case, advisory committees may require more than the minimum number of credits. Once a student begins a Plan A M.S. degree program and receives a graduate research assistantship, they can switch to a Plan B only if approved by the Biomedical Engineering Program Director and major advisor. It is also possible, with identification of a research project and approval from their major advisor, to change from Plan B M.S. degree program to Plan A.

**M.S. Plan A Requirements.** A minimum of 32 credit hours beyond the B.S. is required. The standard Plan A degree requires no fewer than seven graduate courses (21 credits) of advanced course work, a minimum nine additional credits of GRAD 5950; two credit hours of Biomedical Engineering seminar; and successful completion of a thesis. The thesis must be an original and significant contribution to the field of Biomedical Engineering and must be defended orally according to Graduate School requirements. Students under Plan A are required to present and publish their

Master's Thesis at a conference or have a paper accepted before graduation. For Plan A, the plan of study must include the following coursework: three graduate level engineering courses in the area of the student's research (nine credits); one life science course for three credits. Life science courses are typically selected from anatomy and physiology, cell and molecular biology or biophysical chemistry, but are not limited to these areas; one graduate level experimental design course with Biostatistics for three credits; two electives totaling six credits. These consist of graduate level courses selected in consultation with the major advisor in the area related to the student's research; nine credits of GRAD 5950; two semesters, totaling two credits, one credit per semester, of graduate BME seminar; and all course work for the M.S. degree must be at the 5000-6000 level.

**M.S. Plan B Requirements.** The standard Plan B Master of Science in Biomedical Engineering requires a minimum of 32 credits consisting of ten graduate courses (30 credit hours) and two credit hours of Biomedical Engineering seminar. There are no publication requirements for Plan B M.S. degree students. For Plan B, the plan of study must include the following coursework: Five graduate level engineering courses in the student's track (15 credits); two life science course (six credits). Life science courses are typically selected from anatomy and physiology, cell and molecular biology or biophysical chemistry, but are not limited to these areas; one graduate level experimental design course with Biostatistics for three credits; two electives totaling six credits. These consist of graduate level courses selected in consultation with the major advisor in the area related to the student's track; two semesters, totaling two credits, one credit per semester, of graduate BME seminar; at most, six credit hours or two classes may be transferred from other institutions, subject to department approval through a Graduate Petition and to the Graduate School regulations outlined in the Graduate Catalog; and all course work for the M.S. degree must be at the 5000-6000 level.

**Course Substitutions.** If a student has completed equivalent courses in a well-established graduate program, they can apply for a waiver by petitioning the Graduate Program Director by the end of the first semester. If a waiver is granted, the student may substitute elective graduate course credits for the waived course credits.

**Independent Study Courses.** For students under Plan B, at most three credit hours of independent study courses may be applied toward course work requirements. For students under Plan A, independent study is not allowed.

**M.S. Final Examination.** For students under Plan A, an oral examination, often called the thesis defense, is conducted based on the student's thesis research. The decision as to whether the student passes the examination is based on a vote of the advisory committee. For students under Plan B, the format and content of the final examination is determined by the advisory committee. A student must indicate the intention of graduation at least four weeks before the end of the graduate study to the major advisor who will make arrangement for the final examination. The decision as to whether the student passes the examination is based on a vote of the advisory committee.

### **M.S. in Biomedical Engineering (Clinical Engineering Internship Program)**

The requirements for this program include a non-credit clinical internship, carried out off-site in hospitals throughout the United States, in addition to credit hour and other requirements described below. The degree is awarded as either Plan A (thesis option) or Plan B (non-thesis option). Plan A emphasizes problem-solving through research and requires a minimum of 21 credit hours of coursework and a Thesis Project, including nine credits of GRAD 5950. Plan B requires comprehensive understanding of a more general character and requires 30 hours of coursework.

**Clinical Engineering Internship Program Requirements.** A minimum of 30 credit hours beyond the B.S. is required. Plan A requires no fewer than seven graduate courses (21 credits) of advanced course work; a minimum nine additional credits of GRAD 5950; and successful completion of a thesis. The thesis must be an original and significant contribution to the field of Biomedical Engineering and must be defended orally according to Graduate School requirements. Interns under Plan A are required to present and publish their Master's Thesis at a conference or have a paper accepted

before graduation. Students pursuing the internship-based M.S. through Plan B must satisfactorily complete a minimum of 30 credits consisting of ten graduate courses (30 credit hours). There are no publication requirements for Plan B M.S. degree students.

**Plan A Clinical Engineering Internship Requirements:** BME 5020, 5030, 5040, 5050, 5060, 5061; nine credits of GRAD 5950; and three credits of electives, these consist of graduate level courses selected from an approved list maintained on the Biomedical Engineering website. Other courses may be used to complete the elective requirement if approved by the major advisor.

**Plan B Clinical Engineering Internship Requirements:** BME 5020, 5030, 5040, 5050, 5060, 5061; and 12 credits of electives, these consist of graduate level courses selected from an approved list maintained on the Biomedical Engineering website. Other courses may be used to complete the elective requirement if approved by the major advisor.

**Course Substitutions.** If a student has completed equivalent courses in a well-established graduate program, they can apply for a waiver by petitioning the Graduate Program Director by the end of the first semester. If a waiver is granted, the student may substitute elective graduate course credits for the waived course credits.

**Independent Study Courses.** Independent Study courses are not allowed on the Plan of Study for either Plan A or B students pursuing the internship-based M.S. degree.

**M.S. Final Examination.** For students under Plan A, an oral examination, often called the thesis defense, is conducted based on the student's thesis research. The decision as to whether the student passes the examination is based on a vote of the advisory committee. For students under Plan B, the format and content of the final examination is determined by the advisory committee. A student must indicate the intention of graduation at least four weeks before the end of the graduate study to the major advisor who will make arrangement for the final examination. The decision as to whether the student passes the examination is based on a vote of the advisory committee.

### **Ph.D. in Biomedical Engineering**

The Ph.D. is primarily a research degree, and may be undertaken after the M.S. or following the B.S. To be awarded the Ph.D., the student must satisfy all requirements of the Biomedical Engineering Department and all requirements of the Graduate School. These requirements are more extensive than those associated with the M.S. degree and the major ones are as follows.

**Ph.D. Qualifying Examination.** The Biomedical Engineering Ph.D. Qualifying Examination consists of the written proposal and oral examination component. The Qualifying Examination is taken at the end of the second year of the Ph.D. program. The written component of the Qualifying Examination follows the format of a grant proposal on a particular research topic, while the oral component the student is required to defend the proposal. The advisory committee makes a final pass/fail decision for the Ph.D. Qualifying Examination based on the combined results of the written component and oral presentation. In the event of an unsuccessful attempt, the exam may be repeated once if necessary and at the discretion of the committee.

**Ph.D. Prospectus.** Before the Ph.D. dissertation is well under way, the student must file a prospectus, dissertation proposal, of the proposed research, according to Graduate School regulations. The student's advisory committee and the Biomedical Engineering Director of Graduate Studies must approve the prospectus.

**Ph.D. Dissertation.** The most important part of the study for the Ph.D. degree is the dissertation. A dissertation must be an original and significant contribution to the field of engineering science and must be defended orally according to Graduate School requirements.

**Ph.D. Final Examination.** The final examination, an oral examination often called the dissertation defense, deals mainly with the subject matter of the dissertation. The decision as to whether the student passes the examination is based on a vote of the advisory committee.

**Ph.D. Publications.** The student must have submitted a minimum of two papers for publication in the peer reviewed archival literature (journals), and have at least one of these papers published or accepted for publication at the time of the Ph.D. defense. These papers must be based on the student's

dissertation research and must be co-authored by the student's faculty advisor from the Biomedical Engineering Department.

**Ph.D. Required Credit Hours.** For the Ph.D. following the M.S. degree, a minimum of 17 credit hours after the M.S. (excluding requirements for dissertation, language and minor area) is required; for the Ph.D. following the B.S. degree, a minimum of 32 credit hours after the B.S. (excluding requirements for dissertation, language and minor area) is required; at most, six credit hours or two classes may be transferred from other institutions, subject to department approval through a Graduate Petition and to the Graduate School regulations outlined in the Graduate Catalog; all course work for the Ph.D. degree must be at the 5-6000 level; and the advisory committees may require more than the minimum number of credits.

**Ph.D. Plan of Study.** Ph.D. following a B.S.: Five graduate level engineering courses (15 credits) in the student's track; two life science course (six credits). Life science courses are typically selected from anatomy and physiology, cell and molecular biology or biophysical chemistry, but are not limited to these areas; one graduate level experimental design course with Biostatistics for three credits; two electives totaling three credits. These consist of graduate level courses selected in consultation with the Major Advisor in the area related to the student's track; fifteen GRAD 6950 course credits, as described in the Graduate Catalog; two semesters (totaling two credits; one credit per semester) of graduate BME seminar; and all course work for the Ph.D. degree must be at the 5-6000 level. Ph.D. following an M.S.: Three graduate level engineering courses (nine credits) in the student's track; one life science course for three credits. Life science courses are typically selected from anatomy and physiology, cell and molecular biology or biophysical chemistry, but are not limited to these areas; one graduate level experimental design course with Biostatistics for three credits; fifteen GRAD 6950 course credits, as described in the Graduate Catalog; two semesters (totaling two credits; one credit per semester) of graduate BME seminar; and all course work for the Ph.D. degree must be at the 5-6000 level.

**Course Substitutions.** If a student has completed equivalent courses in a well-established graduate program, they can apply for a waiver by petitioning the BME Department Head by the end of the first semester. If a waiver is granted, the student may substitute an equal or greater number of elective graduate course credits for the waived course credits.

**Independent Study Courses.** At most two independent study courses can be applied towards course work requirements and only one independent study course can be taken with the student's major advisor as instructor.

## Chemical Engineering (M.S., Ph.D.)

Study and research programs leading to the degrees of Doctor of Philosophy (Ph.D.) and Master of Science (M.S.) in chemical engineering are offered. Areas of specialization include: environmental engineering, biochemical engineering, polymer science and engineering, process simulation, catalysis and reaction engineering, nanomaterials and nanotechnology, microelectronics, and membrane technology.

**Requirements for the Plan A M.S. Degree.** Students must complete 30 credits of coursework and research, composed of three core courses: CHEG 5301, 5315, and 5321, as well as nine credits of GRAD 5950, and 12 additional credits of advanced coursework and training. Up to six credits of graduate level coursework can be transferred, subject to approval of the graduate committee. The student must assemble a thesis committee and complete a plan of study. There is a publication/product requirement. Students should register for the seminar series each semester it is offered.

**Requirements for the Plan B M.S. Degree.** Students must complete 30 coursework credits, composed of three core courses in thermodynamics, kinetics and mass transport and three credits of an independent study project with one of our faculty members. Since Plan B does not include a thesis, a Plan B student must defend their project orally. There is no language requirement.

**Requirements for the Ph.D. Degree.** Ph.D. candidates with B.S. degrees must complete coursework in three core subjects: CHEG 5301, 5315, 5321, as well as 21 additional credits in advanced coursework and training, for a total of 30 coursework credits. An additional 15 credits of research bring the normal total to 45 credits. Additional coursework may be required for students with non-traditional Chemical Engineering backgrounds. For students with M.S. degrees, the coursework credits are reduced to 15 credits

composed of nine credits from the three core courses and six additional credits of advanced coursework and training. Students must pass an oral qualifying exam taken after the first semester of graduate study. The oral exam involves the presentation and analysis of a paper from the literature assigned by the faculty. The student must assemble a dissertation committee and complete a plan of study. A Dissertation Prospectus should be given before the end of the 5<sup>th</sup> semester of study. In addition, the student must complete a General Examination and written Ph.D. dissertation, which is defended orally. The Ph.D. dissertation must contain the results of original and independent research related to chemical engineering. There is a publication/product requirement subject to approval by the dissertation committee. There is no language requirement. Students should register for the seminar series each semester it is offered.

## Civil Engineering (M.S., Ph.D.)

The Department of Civil and Environmental Engineering offers graduate courses and research opportunities for students seeking a Master of Science (M.S.) or Doctor of Philosophy (Ph.D.) through the Civil Engineering field of study. An M.S. degree awarded in Civil Engineering may be either research-based, Plan A, or coursework-based, Plan B. Plan A students often pursue Ph.D. studies or careers in research and development in government and private institutes. Areas of concentration within Civil Engineering include Applied Mechanics (Ph.D. only), Environmental Engineering (M.S. only), Geotechnical Engineering, Structural Engineering and Transportation and Urban Engineering.

The M.S. and the Ph.D. requirements in Civil Engineering conform to Graduate School requirements. The specific requirements for coursework and research are described below. The Ph.D. in Civil Engineering does not have a related area or foreign language requirement, unless one is specified by the advisory committee. All M.S. and Ph.D. students have to maintain a GPA of 3.0 to maintain their status in the program. Failure to meet this standard triggers a probationary period of one semester, after which the student is subject to dismissal.

### M.S. Plan A Requirements

A total of 30 credits are required for graduation, with a minimum of 21 credits of coursework and a minimum of nine credits of GRAD 5950. A student may enroll in GRAD 5950 credits at any time during the M.S. degree and it is their responsibility to coordinate with their research advisor (and secondarily, with their research committee) on the research plan and requirements for graduation.

A Plan A M.S. requires the submission of an M.S. Thesis, in the form of a submission-ready paper manuscript, and an oral defense for graduation. The oral defense fulfills the role of the final examination for the M.S. degree. The scope, content and length of the M.S. thesis results from the agreement between the research advisor and the student. An advisory committee of at least two additional faculty members will also weigh in on the originality and quality of the thesis prior to graduation. In general, the thesis should present the methodology and results of novel, independent research conducted by the student. Thus, Plan A M.S. theses cannot be solely literature reviews or replicate research already published in the scientific literature. As a standard, the M.S. thesis should constitute the basis for a journal paper submission and may be structured as such.

Additional requirements of individual areas of concentration are noted below.

**Environmental Engineering Requirements:** The Environmental Engineering concentration conforms to the guidelines of the Environmental Engineering Field of Study. Students must complete M.S. Plan A requirements as outlined above.

**Environmental Engineering Core Requirements:** ENVE 5310 and 5320. The remaining courses may be related to one of the three areas of specialization in consultation with the advisor.

**Geotechnical Engineering Requirements:** Five of the following eight courses: CE 5122, 5164, 5530, 5541, 5542, 5543; ENVE 5821 or 5830. The remaining courses may be selected in consultation with the advisor.

**Structural Engineering Requirements:** 21 credits of advanced coursework, of which at least 18 credits must be at the graduate level; three core courses: CE 5122, 5164, and 5610; no more than three credits may be taken as independent study.

**Transportation and Urban Engineering Requirements:** CE 5710; two of the following four courses (six credits): CE 5720, 5730, 5740, 5750; one or more courses in Civil Engineering in the Transportation and Urban Engineering specialization (minimum three credits); two or more courses outside of Civil Engineering/Transportation and Urban Engineering (minimum six credits).

If the student's prior degrees are in an area other than civil engineering with a focus on transportation (or equivalent), the following background preparation courses are required if not previously taken: CE 2251, 2710, and MATH 2110Q.

Students must register for and attend CE 5030 Seminar in Transportation and Urban Engineering every semester in which they are either enrolled for nine or more credits or supported by a graduate assistantship.

The remaining courses may be selected in consultation with the advisor.

### **M.S. Plan B Requirements**

A total of 30 credits are required for Plan B Master's, with a minimum of 27 credits of coursework in Civil Engineering or a related area. The remaining credits may be used towards a research project as CE 5020 or ENVE 5020 for the Environmental Engineering concentration.

Additional requirements of individual areas of concentration are noted below.

**Environmental Engineering Requirements:** The Environmental Engineering concentration conforms to the guidelines of the Environmental Engineering Field of Study. A minimum of 27 credits of coursework is required in Environmental Engineering or related area. The remaining credits may be used towards additional courses or towards a research project as ENVE 5020. All M.S. students are required to take the following core courses: ENVE 5310 and 5320.

The remaining courses may be related to one of the three areas of specialization (atmospheric processes, hydrogeosciences and water resources management, and contaminant fate and resource recovery) in consultation with the advisor.

The final examination for a Plan B Master's is an oral or written exam on three core courses of Environmental Engineering: ENVE 5310 and two additional ENVE courses selected by the student. The exam will take place in the final semester before graduation and it will be administered by the advisory committee that will sign the Plan of Study and the Report on the Final Examination.

**Geotechnical Engineering Requirements:** Five of the following eight courses: CE 5122, 5164, 5530, 5541, 5542, 5543, ENVE 5821 and 5830. The remaining courses may be selected in consultation with the advisor.

**Structural Engineering Requirements:** Three core courses: CE 5122, 5164, and 5610; three credits of CE 5020 used toward the execution of a research project.

**Transportation and Urban Engineering Requirements:** CE 5710; two of the following four courses (six credits): CE 5720, 5730, 5740, or 5750; one or more courses in Civil Engineering in the Transportation and Urban Engineering specialization (minimum three credits); two or more courses outside of Civil Engineering / Transportation and Urban Engineering (minimum six credits).

If the student's prior degrees are in an area other than transportation, the following background preparation courses are required if not previously taken: CE 2251, 2710, and MATH 2110Q.

Students must register for and attend CE 5030 every semester in which they are either enrolled for nine or more credits or supported by a graduate assistantship.

Three credits of CE 5020 used toward the execution of a research project.

The remaining courses may be selected in consultation with the advisor.

### **Ph.D. Requirements**

If a student is admitted to the Ph.D. program with only a B.S. degree, at least 30 credits of coursework are required. If the student has a M.S. degree, the minimum requirement is 15 credits. Students are also required to complete at least 15 credits of GRAD 6950 in addition to coursework requirements.

Additional requirements of individual areas of concentration are noted below.

**Applied Mechanics Requirements:** A minimum of 45 credit hours in post-baccalaureate coursework; three core courses: CE 5122, 5164, and 5610 or CE 5620; no more than three credits may be taken as independent study.

**Structural Engineering Requirements:** A minimum of 45 credit hours in post-baccalaureate coursework; three core courses: CE 5122, 5164, and 5610 or CE 5620; no more than three credits may be taken as independent study.

**Transportation and Urban Engineering Requirements:** CE 5710; two of the following four courses (six credits): CE 5720, 5730, 5740, 5750; one or more courses in Civil Engineering in the Transportation and Urban Engineering specialization (minimum 3 credits); two or more courses outside of Civil Engineering / Transportation and Urban Engineering (minimum 6 credits).

If the student's prior degrees are in an area other than transportation, the following background preparation courses are required if not previously taken: CE 2251, 2710, and MATH 2110Q.

Students must register for and attend CE 5030 Seminar in Transportation and Urban Engineering every semester in which they are either enrolled for nine or more credits or supported by a graduate assistantship.

The advisory committee may substitute the above with equivalent courses. The remaining credits may be taken in one of the three areas of concentration with courses selected in consultation with the advisory committee.

**Ph.D. General Examination.** The General Exam is taken after the student has completed at least 12 credits of coursework (with a M.S.) or 18 credits of coursework (with a B.S.). An approved Plan of Study must be filed with the Graduate School before the General Exam can be taken. The Civil Engineering field of study administers the General Exam as an oral and written examination to test student mastery of core concepts appropriate to the areas of concentration and student ability to integrate concepts across disciplinary areas.

**Ph.D. Dissertation Proposal.** The dissertation proposal is a document that outlines the proposed research for the dissertation and has to be compiled and approved before the research is well underway. It is recommended that the dissertation proposal is submitted for approval in the semester following a student successfully passing their General Exam, and should be submitted no more than one year after the General Exam.

**Ph.D. Candidacy, Dissertation Preparation, and Final Oral Defense.** In addition to Graduate School requirements, the Civil Engineering field of study requires that a Ph.D. student must have three journal papers: one published or accepted for publication, one under review and one in the final stages of preparation. However, it is important that the three papers address a larger, coherent research question (as outlined in the Dissertation Proposal) and are not isolated bodies of work.

## **Computer Science and Engineering (M.S., Ph.D.)**

The Department of Computer Science and Engineering offers both the Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.) degrees.

### **Requirements for the Master's degrees**

The M.S. program in Computer Science and Engineering is offered in two varieties: Plan A, requiring a master's thesis, and Plan B, based entirely on coursework. Each of these programs requires a total of 30 credits, with the thesis counting for 9 credits in the Plan A program. Thus the Plan A program allows a student to combine individual study with general coursework. We strongly encourage the Plan A degree for students aspiring to pursue doctoral studies.

**M.S. Plan A Requirements.** At least 21 credits of graduate level courses, excluding thesis research credits, reflecting a GPA of at least 3.0; at least nine credits of CSE graduate courses other than CSE5097, 5099, and 5600; at most six credits, in total, of CSE 5097, 5099, and 5600; at most three credits of CSE 5097; successful completion, with a grade of B- or better, of CSE 5500, or, at the discretion of the student's adviser, successful completion of a three credit graduate independent study with significant algorithmic content; at least nine credits of GRAD 5950; an oral presentation of a thesis research proposal; completion of a master's thesis and oral presentation of thesis work.

**M.S. Plan B Requirements.** At least 30 credits of graduate level courses; at least 18 credits of CSE graduate courses other than CSE 5097, 5099, and

5600; at most six credits, in total, of CSE 5097, 5099, and 5600; at most three credits of CSE 5097; successful completion, with a grade of B- or better, of CSE 5500, or at the discretion of the student's adviser, successful completion of a three credit graduate independent study with significant algorithmic content.

### Requirements for the Ph.D.

The Ph.D. program requires roughly two years of coursework beyond the M.S. and is intended to prepare students for a career in research. General requirements for the Ph.D. are coursework meeting the Ph.D. program requirements; a dissertation proposal with oral presentation and exam; Ph.D. dissertation and defense; Ph.D. publication requirement; the English proficiency requirement.

**Ph.D. Course Requirements.** Coursework requirements for the Ph.D. depend on whether the student has an existing M.S. degree in Computer Science, Computer Engineering, or Computer Science and Engineering.

Course requirements for students without an existing M.S. (in CS, CE, or CSE): At least 36 credits of graduate level courses, excluding thesis research credits; at least 18 credits of CSE graduate courses other than CSE 5097, 5099, and 5600; at most 12 credits, in total, of CSE 5097, 5099, and 5600; at most three credits of CSE 5097; satisfaction of the Ph.D. breadth requirements (see below); at least 15 credits of GRAD 6950.

Course requirements for students with an existing M.S. (in CS, CE, or CSE): At least 24 credits of graduate level courses, excluding thesis research credits; at least 12 credits of CSE graduate courses other than CSE 5097, 5099, and 5600; at most nine credits, in total, of CSE 5097, 5099, and 5600; at most three credits of CSE 5097; satisfaction of the Ph.D. breadth requirements (see below); at least 15 credits of GRAD 6950.

**The Ph.D. Breadth Requirement.** Ph.D. students must fulfill the breadth requirement by successfully completing four breadth courses selected from the areas below. These courses must additionally satisfy the following requirements: CSE 5500 is mandatory and must appear in the breadth courses; the four breadth courses must be drawn from four distinct areas; and the average GPA for the breadth courses must be a 3.7.

Algorithms (*mandatory*) CSE 5500; Programming Languages. CSE 5102; Theory of Computing. CSE 5506; Networking. CSE 5300; Operating Systems CSE 5306; Architecture. CSE 5302; Parallel and Distributed Computing. CSE 5304 or CSE 5510; Machine Learning and Data Mining. CSE 5713 or CSE 5820.

**The English Proficiency Requirement.** The program requires evidence of English competency for non-native English speakers. The requirement can be met in two ways: either through evidence of level B2 CEFR English competency (TOEFL Speaking score  $\geq$  23, IELTS speaking score  $\geq$  7.0, or official UCAELI assessment via interview); or through successful completion of a UCAELI Evening English Course (EEC).

**Ph.D. Publication Requirement.** All CSE Ph.D. students are required to publish (or have accepted for publication) prior to their dissertation defense, a minimum of three conference level papers; each paper must be a peer-reviewed full conference article, i.e., submitted and reviewed as a full paper and not as an abstract. Published journal articles may also be used to fulfill the requirement, though they must substantially differ from any conference articles used to satisfy the requirement. Major advisers have the authority to establish a higher threshold of publications for their students.

## Electrical Engineering (M.S., Ph.D.)

The Electrical and Computer Engineering (ECE) department offers Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Electrical Engineering with two possible areas of concentration: Electronics, Photonics and Biophotonics or Information, Communication, Decision, and Biosystems. The ECE faculty research spans these areas including projects on control and communications, radar, data fusion, signal and image processing, robotics, sustainable energy systems, semiconductor devices, nanotechnology, and computer engineering.

### M.S. in Electrical Engineering

The M.S. degree program satisfies a number of different needs. Many students enter the M.S. degree program to round out their educational objectives, prior to seeking employment in a specialized field of study within Electrical Engineering. In this case, the M.S. degree represents a terminal

point in their formal studies. Other students plan to continue their studies at the Ph.D. level. In this case the M.S. degree represents a preparatory period designed to give the student the tools and background needed to carry out the more individualized and self-directed research involved in Ph.D. studies.

Either approach is designed to provide comprehensive knowledge of the theoretical and applied aspects of the student's chosen area of concentration. The graduate program is predicated on students having developed a strong technical background in basic Electrical and Computer Engineering through work in undergraduate courses. The objective of the graduate program is to enhance this background by providing more advanced course work, along with insight into state-of-the-art problems and new research areas.

The Master's degree may be earned under either of two plans as determined by the student and the advisory committee: Plan A, emphasizing research, and Plan B, emphasizing graduate course work.

**M.S. Plan A Requirements.** Students must take a minimum of 30 credits in the program. Typically, this consists of 9-12 credits each semester.

The requirements consist of: At least 21 credits of graduate course work. Some students may need more than seven courses to complete Plan A of study. Final determination is made by the student and the student's advisory committee; students in the Information, Communication, Decision, and Biosystems area may include no more than three credits of ECE 6099 courses; students in the Electronics, Photonics, and Biophotonics area may include no more than six credits of ECE 6099; at least 9 credits of GRAD 5950; satisfactory completion of a Master's thesis, with oral presentation; one credit of ECE 6094; have one conference proceedings (CP) (full) paper accepted by the time of graduation. A journal paper may be substituted for the CP.

The courses required of M.S. Plan A candidates depend on their area of concentration: Information, Communication, Decision, and Biosystems or Electronics, Photonics and Biophotonics.

A nanotechnology track is also available.

**M.S. Plan B Requirements.** Students must take a minimum of 30 credits in the program. Typically, this consists of 9-12 credits each semester. The requirements consist of: At least 30 credits (10 courses) of graduate work, with no more than six credits of ECE 6099; one credit of ECE 6094 for full-time on-campus students; passing a comprehensive M.S. examination, which is based on the core course work. The courses required of M.S. candidates (both Plan A and plan B M.S.) depend on their area of concentration as follows.

**Information, Communication, Decision, and Biosystems Requirements:** The following courses are required of all M.S. degree candidates (Plan A) in the Information, Communication, Decision, and Biosystems area: ECE 5101, 6111, 6122, 6151, and 6439. It is not necessary that the remaining courses taken be in the Information, Communication, Decision, and Biosystems, although generally they tend to be.

**Electronics, Photonics, and Biophotonics Requirements:** The following course requirements apply to all M.S. degree candidates in the Electronics, Photonics, and Biophotonics area, except those pursuing the Nanotechnology track (see below).

At least one course from each of the three areas (EM/Photonics, Semiconductor/Optoelectronic Devices and Applications) is required of all M.S. degree candidates in the Electronics, Photonics, and Biophotonics area, except those pursuing the Nanotechnology track (see below).

**Area One:** EM/Photonics: choose at least one course from ECE 5201 or 5231.

**Area Two:** Semiconductor/Optoelectronic devices: choose at least one course from Group 2.A (intended primarily for electronics/photonics students) ECE 5211, 5212, 5225, 5232, 6222 or Group 2.B (intended primarily for Bio-Photonics students) BME 5210, BME/ECE 6143, ECE 5101, 6111, 6121, 6122, 6125, 6439.

**Area Three:** Applications: choose at least one course from BME 6420, BME/ECE 6126, ECE 5223, 6095 (with topic Memory Devices and Technology, Solar Photovoltaic Energy Conversion, or Metamaterials), 6211, 6212, 6242, 6243, 6421.

It is not necessary that the remaining courses taken be in the Electronics, Photonics, and Biophotonics area, although they generally tend to be.

**Nanotechnology track:** Select three or four from this group: ECE 5201/6212, 5211/6222, 5212/5231/5232, 5234 (or Independent Study ECE 6099 on Nanophotonics), 6421, or 6242.

Select three or four from this Specialization: ECE 6099 Independent Study in Nanotechnology (up to 6 credits), 6126, 6243, or 6244.

### Ph.D. Requirements

Two conference proceedings, full length papers accepted with first authorship (Journal Papers may be substituted for conference proceedings) by the time of the prospectus.

Three journal papers with first authorship by the time of the defense, two accepted and one submitted (With the approval of the advisory committee, up to two journal papers may be replaced by full proceedings papers with first authorship presented at leading international conferences with a documented acceptance rate of under 30% based on data from the previous year), in either scenario, at least one journal paper should have been accepted by the time of the defense.

A cumulative GPA of 3.0 or above; pass a two-part general examination near the end of the formal course work; and complete a dissertation which represents a significant contribution to the field.

### Electronics, Photonics, and Biophotonics Requirements

For the graduate program in Electronics, Photonics, and Biophotonics, the Ph.D. course requirements are the same as those listed in the graduate catalog with the following addition: two credits of ECE 6094.

### Computer Engineering Track Ph.D. Requirements

#### For Student Holders of M.S. Degree

Students must take at least 15 credits of appropriate graduate course work. Of these a maximum of three credits may be ECE 6099. Any further ECE 6099 credits will be shown on the Plan of Study, but are additional to the 15 required.

The foreign language/related area can be satisfied in two ways: either by six credits of additional graduate work in any single technical area (such as Statistics, Physics, Mathematics, another Engineering field); or by any foreign language.

The Plan of Study requires a minimum of five ECE or CSE graduate courses (15 credits); plus two related-area graduate courses (six credits) or a foreign language.

The seminar ECE 6094 has to be taken for credit at least twice by giving a talk, e.g., on a conference paper to be presented by the student.

A minimum of 15 credits of GRAD 6950.

The Ph.D. General Examination consists of four exams on Computer Architecture, VLSI Design, Systems, and Algorithms. After the Plan of Study is approved, a Ph.D. Dissertation Prospectus should be submitted.

#### For Student Holders of B.S. Degree

Students must take at least 33 credits of appropriate graduate course work. Of these a maximum of three credits may be ECE 6099. Any further ECE 6099 credits will be shown on the Plan of Study, but are additional to the 33 required.

The foreign language/related area can be satisfied in two ways: either by six credits of additional graduate work in any single technical area (such as Statistics, Physics, Mathematics, another Engineering field) or by any foreign language.

The Plan of Study requires a minimum of 11 ECE or CSE graduate courses (33 credits); plus two related-area graduate courses (six credits) or a foreign language.

The seminar ECE 6094 has to be taken for credit at least twice by giving a talk, e.g., on a conference paper to be presented by the student.

A minimum of 15 credits of GRAD 6950.

The Ph.D. General Exam consists of four exams on Computer Architecture, VLSI Design, Systems, and Algorithms. After the Plan of Study is approved, a Ph.D. Dissertation Prospectus should be submitted.

### Information, Communication, Decision, and Biosystems Ph.D Requirements

#### For Student Holders of M.S. Degree

Students must take at least 18 credits of appropriate graduate course work. Of these a maximum of three credits may be ECE 6099. Any further ECE 6099 credits or credits of the three basic courses (listed below) will be shown on the Plan of Study, but are additional to the 18 required. With the approval of the student's Advisory Committee, a maximum of six credits of GRAD 6950 can count towards these 18 credits.

The foreign language/related area can be satisfied in two ways: either by six credits of graduate work in any single technical area (such as Computer Science, Statistics, Physics, Mathematics, another Engineering field, or non-Systems ECE) or by any foreign language. If the latter is chosen, then rather than 18 credits of course work as stated above, the student must take 24 credits, with six credits as the related area.

ECE 5101, 6111, and 6122 are introductory basic graduate courses and should not normally count toward the 18-24 required credits for the Ph.D. In special circumstances, a Systems Group Ph.D. student's M.S. background may be considered to have little in common with the Systems Group M.S., but nonetheless to be a significant contribution to the students Ph.D. research. In such cases the student's Advisory Committee may decide that some or all of these courses may be counted toward Ph.D. totals. Such cases are assumed to be unusual.

ECE 6094 has to be taken for credit at least twice by giving a talk, e.g., on a conference paper to be presented by the student. Attendance of this seminar is required every semester for full-time students.

A minimum of 15 credits of GRAD 6950, including the possible six credits of GRAD 6950 that are mentioned above.

The student's Plan of Study should be completed according to the above requirements and approved before the Ph.D. General Examination. The student's Advisory Committee has the final word on all Plan of Study matters.

The Ph.D. General Examination for Information, Communication, Decision, and Biosystems students consists of required courses: ECE 5101, 6111, 6122, 6439 and one of the following ECE 6099, 6121, 6123, 6151, 6437; Elective courses: two additional courses, in agreement with the Advisory Committee.

The Ph.D. General Examination for students in Bio Systems track consists of required courses: ECE 5101, 6111, 6122, 6123; Elective courses: three additional (Bio) courses, in agreement with the Advisory Committee.

The Ph.D. General Examination for students in Power Systems track consists of seven courses as follows: required courses: three or four out of the ICD track required courses; Elective courses: three or four out of ECE 6437, 6095 (Renewable energy power conversion), 6095 (Transients in power systems), 6095 (Photovoltaic power conversion), 6095 (Power electronics), or 6095 (Modern power systems), in agreement with the Advisory Committee.

The Ph.D. examination has a written part on the above courses and an oral part at the discretion of the instructors who provided the written part problems for these courses. Passing the Ph.D. examination requires an average of 6/10 with no grade below 5/10 in any of the written parts and the signatures of the advising committee and of each instructor who provided problems for the written part.

A Ph.D. Dissertation Prospectus should be submitted at least six months before the defense. Each student must satisfy the following minimum research publications requirements: by the time of the prospectus: two CP (Conference Proceedings) full papers accepted; by the time of the Ph.D. defense: 2 RJ (Research Journal) papers accepted, and all with primary authorship by the student.

#### For Students Holders of B.S. Degree

Students must take at least 36 credits of appropriate graduate course work. Of these a maximum of three credits may be ECE 6099. Any further ECE 6099 credits will be shown on the Plan of Study, but are additional to the 36 required. With the approval of the student's Advisory Committee, a maximum of six credits of GRAD 6950 can count towards these 36 credits.

The foreign language/related area can be satisfied in two ways: either by six credits of graduate work in any single technical area (such as Computer Science, Statistics, Physics, Mathematics, another Engineering field, or non-Systems ECE), or by any foreign language. If the latter is chosen, then rather than 36 credits of course work, the student must take 42 credits, with six credits as specified above.

The Plan of Study will therefore show a minimum of 36 credits, plus two related area graduate courses for six credits, with the option of a foreign language.

The seminar ECE 6094 has to be taken for credit at least two times by giving a talk, e.g., on a conference paper to be presented by the student. Attendance of this seminar is required every semester for full-time students.

A minimum of 15 credits of GRAD 6950, including the possible six credits of GRAD 6950 that are mentioned above.

The Plan of Study should be completed according to the above requirements and approved before the Ph.D. General Examination. The student's Advisory Committee has the final word on all Plan of Study matters.

The Ph.D. General Examination consists of the same as in the Ph.D. requirements for students starting with an M.S. degree.

After the Plan of Study is approved, a Ph.D. Dissertation Prospectus should be submitted at least six months before the defense.

Minimum research publications requirements:

By the time of the prospectus: two conference proceedings full papers accepted (journal papers may be substituted for conference proceedings). By the time of the Ph.D. defense: three research journal papers (two accepted and one submitted). With the approval of the advisory committee, up to two journal papers may be replaced by full conference proceedings papers with a documented acceptance rate of under thirty percent based on data from the previous year. In either scenario, at least one journal paper should have been accepted by the time of the defense. All with primary authorship by the student.

## Engineering (M.Eng.)

The School of Engineering offers a Master of Engineering degree with the following concentrations: Advanced Systems Engineering, Civil and Environmental Engineering, Clinical Engineering, Contaminated Site Remediation, Electrical and Computer Engineering, General Engineering, Materials Science and Engineering, and Mechanical Engineering. In addition, the School offers a dual degree with the Master of Business Administration program (M.B.A./M.Eng.).

### Advanced Systems Engineering M.Eng.

The UTC Institute for Advanced Systems Engineering has created a program to train the engineer of the next decade, one who is not constrained by disciplines, and that can bridge the gap between theory and application in the field of cyberphysical systems (C.P.S.) engineering. Students achieve a depth of knowledge in systems engineering practices and methods to be able to work as a systems engineer and provide leadership and expertise on the development of their company's systems engineering processes, functions, and methods. The program teaches requirements analysis, architecture selection, model-based system engineering methods, decision-making, optimization, verification and validation of engineered systems.

**Advanced Systems Engineering Requirements:** Required core courses are ENGR 5311, 5312, 5314, and 5300; one introductory course must be selected from SE 5000 or 5001; one modeling course must be selected from SE 5001, 5101, or 5201; two concentration courses must be selected from SE 5102, 5202, 5302, 5402, or 5095 Special Topics for three credits; two electives are required for the remaining required credits, which can be chosen from any engineering discipline. Requirements consist of four core courses and six additional concentration category courses for a total of 30 credits.

### Civil and Environmental Engineering M.Eng.

The Civil and Environmental Engineering department offers a 30 credit Master of Engineering concentration with a focus on structural engineering. This may include multi-disciplinary research in the areas of structural engineering, advanced design, structural vibrations, and others. This involves the design of buildings, bridges and other structures and applied mechanics which form the basis of all structural analysis and design.

**Civil and Environmental Engineering Requirements:** Required core courses are ENGR 5311, 5312, 5314, and 5300; concentration core courses, three including the first two: CE 5122, 5164, 5160, and 5620. At least one elective course is required from the following: CE 5128, 5150, 5151, 5163,

5166, 5380, 5610 (if not taken as a concentration core course), 5620 (if not taken as a concentration core course), and CE 5640.

### Clinical Engineering M.Eng.

The Biomedical Engineering department offers a 30 credit concentration in Clinical Engineering. Upon completion of this concentration, students will be able to lead healthcare technology implementation and improvement by working with clinicians and administrators, investigate technology related incidents and accidents, evaluate and specify utility systems which connect to medical equipment, analyze methods to interconnect medical devices to hospital computer networks to transfer data, preparation for certification by the American College of Clinical Engineering, exposure in the community, staying abreast of current technology and best practices, and preparation to advance in professional responsibilities and scope of expertise.

**Clinical Engineering Requirements:** Required core courses are ENGR 5311, 5312, 5314, and 5300; required concentration courses are BME 5020, 5030, 5040, 5050, 5070, and 6086.

### Contaminated Site Remediation M.Eng.

The Civil and Environmental Engineering department has created a series of courses that will provide the necessary knowledge at an advanced level to engage in the design of contaminated site investigations, remediation and redevelopment. Students will be able to use appropriate tools for the planning of subsurface investigations, design waste containment systems and apply fundamental physical, chemical and biological principles to evaluate contaminant fate and transport and design soil and groundwater treatment methods in the context of the appropriate regulatory framework. Various project planning methodologies and techniques are examined and effective communication strategies are discussed.

**Contaminated Site Remediation Requirements:** Required core technical courses are ENVE 5210, 5252, and 5530; three of the following are required for the technical elective courses: ENVE 5240, 5310, 5311, 5370, 5821, and 5830; required core M.Eng. courses are ENGR 5311, 5312, 5314, and 5300. Requirements consist of three M.Eng. core courses, three technical core courses, three technical elective courses, and a capstone design course, totaling 30 credits.

### Electrical and Computer Engineering M.Eng.

The Electrical and Computer Engineering department offers a 30 credit Master of Engineering concentration. Electrical Engineering focuses on various industries from electric power and communications to create technologies connecting the world and helping to improve our lives. Computer Engineering emphasizes the analysis, design, implementation, optimization, and application of computing systems. This concentration allows students to provide technical contributions to design, development, and manufacturing in their practice of electrical and systems engineering, in addition to professional development.

**Electrical and Computer Engineering Requirements:** Core courses are ENGR 5311, 5312, 5314 and 5300; 18 credits are required for concentration courses and can be chosen from ECE 5101, 5121, 5201, 5231, 6095 (EM Transients in Power Systems for three credits, 6095 (Multi-disciplinary Optimization Techniques for System Design for three credits, 6095 (Renewable Energy Power Conversion for three credits, 6102, 6104, 6108, 6122, 6243, and 6437. Other graduate engineering courses may be taken as concentration electives with prior approval of the advisor.

### General Engineering M.Eng.

The General Engineering concentration is multidisciplinary. This is particularly attractive to practicing engineers and professionals in related fields who seek a wider base of knowledge. The M.Eng. in General Engineering requires students to complete 30 credits of graduate level study. Students in this degree concentration will be required to study a set of core disciplines, as well as a range of elective courses.

**General Engineering Requirements:** Core courses are ENGR 5311, 5312, 5314, and 5300 Capstone Project for three credits. To facilitate further flexibility in coursework structure, students are required to complete 18 additional engineering credits with guidance provided from their advisor.

### Materials Science and Engineering M.Eng.

The Materials Science and Engineering department offers a 30 credit Master of Engineering concentration. The field of Materials Science and Engineering involves the discovery and design of new materials, with an emphasis on solids. The courses investigate several types of materials, such as metals, ceramics, electronic materials, and biological materials, from a single viewpoint that examines the connections between the material's structures and the processing, properties, and overall performance.

**Materials Science and Engineering Requirements:** Core courses are ENGR 5311, 5312, and 5300 Capstone Project for three credits. 21 credits of concentration courses are required. Students must take at least 12 of the 21 remaining credits in MSE or courses focused on MSE topics from the following courses: MSE 5301, 5309, 5322, and 5334. Graduate electives that may be taken by MSE M.Eng. students are MSE 5001, 5305, 5310, 5311, 5313, 5317, 5323, 5335, 5343, 5364, 5366; ENGR 5314.

### Mechanical Engineering M.Eng.

The Mechanical Engineering Department offers a 30 credit Master of Engineering concentration in Mechanical Engineering. These courses encompass analysis, design, manufacturing, and maintenance of mechanical systems. There are two concentration paths: Systems and Mechanics, and Thermal and Fluid Sciences.

**Mechanical Engineering Requirements:** Core courses are ENGR 5311, 5312, 5314, and 5300 Capstone Project for three credits.

The core courses required for the Systems and Mechanics concentration path are ME 5105, 5150, 5155, 5160, 5180, 5190, and 5420. Chose six of the seven courses for a total of 18 credits.

The core courses required for the Thermal and Fluid Sciences concentration path are ME 5110, 5120, 5130, 5140, 5311, and 6170.

One three credit elective is required from: ME 5210, 5320, 5511, 5895, 5895, or 6160.

To facilitate further flexibility in coursework structure, it is possible for students to use certain elective courses to substitute for closely related core courses. This must be done by students receiving approval from their major advisor.

## Environmental Engineering (M.S., Ph.D.)

The Environmental Engineering Program offers two graduate degrees, Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). The M.S. degree is awarded in Environmental Engineering and may be either research-based, Plan A, or coursework-based, Plan B. Plan A students often pursue further Ph.D. studies or careers in research and development in government and private institutes. The Ph.D. in Environmental Engineering prepares students for research and teaching careers in environmental engineering, including higher education, private foundations, and state, local, or federal government agencies. Both M.S. and Ph.D. degrees are offered in three areas of specialization: atmospheric processes, hydrogeosciences and water resources management, and contaminant fate and resource recovery.

**Environmental Engineering Requirements.** The M.S. and the Ph.D. requirements in Environmental Engineering conform to Graduate School requirements. The specific requirements for coursework and research are described below. The Ph.D. in Environmental Engineering does not have a related area or foreign language requirement, unless one is specified by the advisory committee.

**Environmental Engineering M.S. Plan A Requirements.** A total of 30 credits are required for graduation, with a minimum of 21 credits of coursework in Environmental Engineering or related area and a minimum of nine credits of GRAD 5950. A student may enroll in GRAD 5950 credits at any time during the M.S. degree and it is their responsibility to coordinate with their research advisor and secondarily, with their research committee, on the research plan and requirements for graduation.

All M.S. students are required to take ENVE 5310 and 5320.

The remaining courses may be related to one of the three areas of specialization in consultation with the advisor.

A plan A M.S. requires the submission of an M.S. thesis, in the form of a submission-ready paper manuscript, and an oral defense for graduation. The oral defense fulfills the role of the final examination for the M.S. degree.

The scope, content and length of the M.S. thesis results from the agreement between the research advisor and the student. An advisory committee of at least two additional faculty members will also weigh in on the originality and quality of the thesis prior to graduation. In general, the thesis should present the methodology and results of novel, independent research conducted by the student. Thus, plan A M.S. theses cannot be solely literature reviews or replicate research already published in the scientific literature. As a standard, the M.S. thesis should constitute the basis for a journal paper submission and may be structured as such.

**Environmental Engineering M.S. Plan B Requirements.** A total of 30 credits are required for plan B Master's, with a minimum of 27 credits of coursework in Environmental Engineering or related area. The remaining credits may be used towards additional courses or towards a research project by taking ENVE 5020.

All M.S. students are required to take ENVE 5310 and 5320.

The remaining courses may be related to one of the three areas of specialization in consultation with the advisor.

The final examination for a plan B Master's is an oral or written exam on three core courses of Environmental Engineering: ENVE 5310 and two additional ENVE courses selected by the student. The exam will take place in the final semester before graduation and it will be administered by the advisory committee that will sign the Plan of Study and the Report on the Final Examination.

### Environmental Engineering Ph.D. Requirements

If a student is admitted to the Ph.D. program with only a B.S. degree, at least 30 credits of coursework are required. If the student has a M.S. degree, the minimum requirement is 15 credits. However, if the M.S. degree is in a field other than Environmental Engineering, the Environmental Engineering Graduate Admissions committee will determine the minimum number of credits required for coursework.

All Ph.D. students are required to take or demonstrate proficiency in the following courses prior to taking the General Examination: ENVE 5210, 5310, 5320, and 5810.

The advisory committee may substitute the above with equivalent courses. The remaining credits may be taken in one of the three areas of specialization with courses selected in consultation with the advisory committee.

The General Examination is taken after the student has completed at least 12 credits of coursework (with a M.S.) or 18 credits of coursework (with a B.S.). The program administers the examination twice a year, in January and in May. An approved Plan of Study must be filed with the Graduate School before the general examination can be taken. The Environmental Engineering Program administers the General Examination as an oral examination to test student mastery of core environmental engineering concepts and student ability to integrate concepts across disciplinary areas.

The Dissertation Proposal is a document that outlines the proposed research for the dissertation and has to be compiled and approved before the research is well underway. It is recommended that the dissertation proposal is submitted for approval in the following semester after a student passes their General Examination, but the maximum time is one year after the General Examination.

In addition to Graduate School requirements, the Environmental Engineering Program requires that a Ph.D. student must have three journal papers. One published or accepted for publication, one under review and one in the final stages of preparation. However, it is important that the three papers address a larger, coherent research question as outlined in the Dissertation Proposal and they are not isolated bodies of work.

## Materials Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science offers programs leading to Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in the area of Material Science. All programs include training in synthesis, characterization, and applications of materials, and give students sufficient flexibility to pursue their special interests as well as time to take courses in other departments at the University of Connecticut.

### Master of Science in Materials Science

The program normally requires 31 credits. While it is possible to complete the M.S. degree within a year, most students will need three to four semesters. The courses of the program cover courses concerning synthesis, characterization, and applications of materials. The plan of study for the M.S. degree may be formulated with related work in almost any area, e.g., Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. Students are encouraged to participate in research projects done by members of the department.

**Requirements.** There are no specific required courses. All students must choose a committee for the M.S. degree and that committee must approve all courses. Typical courses are any of the 5000 series courses in Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. The final requirement is passing the Master's Exam which has two parts. One is a written test concerning basic understanding of course materials. The second requirement is a final oral exam which includes course work, and any research done by the student. For a course work master's degree there is no thesis requirement. For a research based Master's degree, there is a requirement of a Master's thesis. All students are encouraged to follow the research degree route.

In order to be considered for a possible switch to the Ph.D. program or for financial support, a student with an M.S. degree in Materials Science or someone showing great promise during the M.S. program needs to apply to the Ph.D. Program.

### Ph.D. Program

Emphasizes development of the ability to generate novel research results in Materials Science. Individuals with a Bachelor's degree in any major, with an interest in Materials Science are encouraged to apply. The course work typically consists of at least 16 graduate level courses that cover a wide range of topics, including Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. After completing the necessary course work and a sequence of examinations, a Ph.D. candidate must complete a dissertation that makes an original contribution to the field of Materials Science.

**Requirements.** For students entering the program after a Bachelor's Degree, typically 16 to 18 courses are required. An individual plan of study is developed by the student and their Advisory Committee. Courses in the following departments are considered: Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering.

In general, Ph.D. students must take graduate level courses that are approved by the major advisor of a student, as well as the student's advisory committee. The materials science program has no requirement on foreign languages.

The first formal requirement for the Ph.D. degree is passing the General Examination. The general examination consists of a written exam which is an original proposal. If the student passes the written exam, they are then asked to prepare for an oral examination. The oral exam consists of any aspect of course work, the written exam questions, and the proposal, research progress, or combinations of these. The preparation of a dissertation then follows, where the student must present an original contribution to the general area of Material Science. The final requirement is a defense of the Ph.D. dissertation before the Ph.D. Advisory Committee, students and anyone else interested in attending. The exam consists of a presentation by the student, questions of the students and audience, and then a closed session of questions from the Advisory Committee.

### Materials Science and Engineering (M.S., Ph.D.)

The goal of the graduate program in Materials Science and Engineering (MSE), through its coursework and research programs, is to provide students with a comprehensive understanding of modern materials and to prepare them for positions of leadership in engineering, research and

development. Graduate instruction is offered which leads to the degrees of Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). Emphasis is placed on the relationships between structure, properties, processing, and performance of materials. In addition, several departments in the University offer relevant courses in related disciplines; students are encouraged to include one or more of these courses in their plan of study. Any courses at the 3000 or 4000 level must be approved in advance by the Major Advisor; not more than six such credits may be accepted towards a Masters or Ph.D. degree.

### M.S. Requirements

Students may pursue either a Plan A (thesis-based) or a Plan B (coursework-based) M.S. degree.

For Plan A, the student must successfully complete at least 21 credits of coursework, maintaining a cumulative GPA of 3.0 or above. At least 12 of these credits must be MSE courses, with the remainder approved by the Major Advisor. The student must also complete at least nine credits of GRAD 5950, ultimately preparing and publicly defending the M.S. thesis.

For Plan B, the student must successfully complete at least 27 credits of coursework, maintaining a cumulative GPA of 3.0 or above. At least 18 of these credits must be MSE courses, with the remainder approved by the Major Advisor. The student must also complete three credits of independent study in MSE culminating in a final project report that must be approved by the advisory committee.

### Ph.D. Requirements

Core courses required are MSE 5301, 5309, 5322, and 5334. Students must maintain a cumulative GPA of at least 3.0 in these courses. Suitable courses may be substituted for core courses if equivalent topical competency can be demonstrated.

Ph.D. students must also maintain a cumulative GPA of at least 3.0 for a minimum of 30 overall course credits, including the core courses. A maximum of 12 credits may be taken in fields of study other than MSE with Major Advisor approval. For those already entering with a master's degree in the same or a closely related field of study, a minimum of 15-credits of content coursework are required with a maximum of six credits in a related field.

All Ph.D. students must also complete at least 15 credits of GRAD 6950, for a total number of credits not less than 45, 30 if matriculating with a related master's degree. All resident full-time MSE Ph.D. students must enroll in the one credit seminar course, MSE 6401, every term, and all Ph.D. students must pass a Qualifying Examination administered by the MSE graduate faculty.

Ph.D. candidates must prepare and orally defend a dissertation proposal. At this oral defense, the students must also complete the General Examination covering broader aspects of materials science and engineering. Ultimately, the candidate must prepare and publicly defend the Ph.D. dissertation. The dissertation research must be deemed by the Examination Committee as publishable in a refereed journal in the field.

### Mechanical Engineering (M.S. and Ph.D.)

The Department of Mechanical Engineering offers degree programs leading Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) degrees.

To determine the appropriate course requirements the student must first choose one of the two areas of concentration in the Mechanical Engineering Department: Systems and Mechanics or Thermal and Fluid Sciences. The specific core course requirements for each of these areas differ as listed below.

**Systems and Mechanics Core Course Requirements:** ME 5105, 5150, 5155, 5160, 5180, 5190, and 5420.

**Thermal and Fluid Sciences Core Course Requirements:** ME 5110, 5120, 5130, 5140, 5311, and 6170.

### M.S. Degree Requirements

The M.S. degree may be earned under either Plan A (thesis option) or Plan B (non-thesis option). Plan A emphasizes problem-solving through research, and involves close interactions with mechanical engineering faculty members, while Plan B focuses on graduate level course work in mechanical engineering topics.

A total of 30 credit hours after the B.S. is required. In Mechanical Engineering, Plan A requires 21 credits of advanced course work and successful completion of a thesis. Thesis work for the Plan A option is equivalent to nine credit hours. The thesis must be an original and significant contribution to the field of engineering science and must be defended orally according to Graduate School requirements. Plan B requires at least 30 credits of advanced course work. After completion of at least 24 credits, the student must take and successfully pass an oral examination in compliance with Graduate School requirements.

At most, six credit hours or two classes may be transferred from other institutions, subject to department approval through a Graduate Petition and to the Graduate School regulations outlined in the Graduate Catalog.

At most, three credit hours of course work can be in University of Connecticut 3-4000 level courses that are not required for the undergraduate Mechanical Engineering degree and are not open to sophomore students.

**Plan of Study.** The plan of study should be prepared with the aid and approval of the advisory committee and be approved by the Director of Graduate Studies and the Executive Committee of the Graduate Council. All students must have a plan of study on file at the Graduate School and the Mechanical Engineering Department. For Mechanical Engineering M.S. students, the plan of study must include the following coursework:

- Four Mechanical Engineering core courses chosen from the student's area of concentration.
- One mathematics, computational, engineering analysis or statistics course.
- ME 6340 Graduate Seminar for at least three semesters enrolled as a full-time student. A student is required to attend at least five ME seminars during the semester to pass ME 6340.
- Two elective courses with at least one in Mechanical Engineering (Plan A), or five elective courses with at least three in Mechanical Engineering (Plan B). Elective courses outside of engineering, science or mathematics must be approved by the student's advisory committee in advance. Courses that are specific for the Master of Engineering (MENG) program, including ENGR 5311, 5312, and 5314, may not be used toward the M.S. degree.
- Nine credits of GRAD 5950, as stipulated in the Graduate Catalog (Plan A).

If a student has completed equivalent courses in a well-established graduate program, they can apply for a waiver by petitioning the Department Head by the end of the first semester. If a waiver is granted, the student may substitute elective graduate course credits for the waived course credits. However, at least two of the required core courses must be taken at the University of Connecticut.

At most two independent study courses may be applied toward course work requirements. For students under Plan A, only one independent study course can be taken with the student's major advisor as instructor.

For students under Plan A, an oral examination, often called the thesis defense, is conducted based on thesis research. The decision as to whether the student passes the examination is based on a vote of the advisory committee.

For students under Plan B, the format and content of the final examination is determined by the advisory committee. A student must indicate the intention of graduation at least 4 weeks before the end of the graduate study to the major advisor who will make arrangement for the final examination. The decision as to whether the student passes the examination is based on a vote of the advisory committee.

### Ph.D. Degree Requirements

The Ph.D. is primarily a research degree and may be undertaken after the M.S. or following the B.S. To be awarded the Ph.D., the student must satisfy all requirements of the Mechanical Engineering Department and all requirements of the Graduate School. These requirements are more extensive than those associated with the M.S. degree and the major ones are as follows.

The Mechanical Engineering Ph.D. Qualifying Examination consists of the written part and the oral part. The student must take the written part of the Ph.D. Qualifying Examination for the first time immediately following their first semester of the Ph.D. program at the University of Connecticut. In the event of an unsuccessful first attempt, the student must re-take the

examination at its next offering in the following semester. After successfully passing the written part of the exam, the candidate must schedule a 45-minute presentation, which is the oral part of the Ph.D. Qualifying Examination, with their Ph.D. advisory committee no later than six months following the written topical examinations. This presentation should focus on a particular research area and should discuss relevant literature including no fewer than 10 journal articles. The advisory committee makes a final pass/fail decision for the Ph.D. Qualifying Examination based on this presentation, which can be repeated once if necessary and at the discretion of the committee.

Before the Ph.D. dissertation is well under way, the student must file a prospectus of the proposed research, according to Graduate School regulations. The student's advisory committee and the Mechanical Engineering Director of Graduate Studies must approve the prospectus.

The most important part of the study for the Ph.D. degree is the dissertation. A dissertation must be an original and significant contribution to the field of engineering science and must be defended orally according to Graduate School requirements. A copy of the dissertation must be made available to the advisory committee at least two weeks prior to the final examination. Other requirements are described in the Graduate Catalog.

The final examination, an oral examination often called the dissertation defense, deals mainly with the subject matter of the dissertation. At least five members of the faculty including all members of the advisory committee must be present for the final examination. The dissertation defense is open to the public. The decision as to whether the student passes the examination is based on a vote of the advisory committee.

The student must have submitted a minimum of two papers for publication in the archival literature (journals), and have at least one of these papers published or accepted for publication at the time of the Ph.D. defense. These papers must be based on the student's dissertation research and must be co-authored by the student's faculty advisor from the Mechanical Engineering Department.

For the Ph.D. following the M.S. degree, a minimum of 21 credit hours after the M.S. (excluding requirements for dissertation, language and minor area) is required. In exceptional cases, and for students with substantial post-M.S. graduate work elsewhere, the total after the M.S. may be reduced to 18 credit hours taken at the Mechanical Engineering Department Ph.D. program upon successful petition to the Department Head.

For the Ph.D. following the B.S. degree, a minimum of 42 credit hours after the B.S. (excluding requirements for dissertation, language and minor area) is required. In exceptional cases, and for students with substantial post B.S. graduate work elsewhere, the total of credit hours after B.S. may be reduced upon successful petition to the Department Head.

At most, six credit hours or two classes may be transferred from other institutions, subject to department approval through a Graduate Petition and to the Graduate School regulations outlined in the Graduate Catalog.

At most, three credit hours of course work can be in University of Connecticut 3-4000 level courses that are not required for the undergraduate Mechanical Engineering degree and are not open to sophomore students.

The student's plan of study should be prepared with the aid and approval of the advisory committee and be approved by the Director of Graduate Studies and the Executive Committee of the Graduate Council. All students must have a plan of study on file at the Graduate School and the Mechanical Engineering Department. For Mechanical Engineering students, the plan of study must include the following coursework:

### Ph.D. following a B.S.

- Four Mechanical Engineering Ph.D. core courses in the student's area of concentration.
- Two advanced graduate courses in mathematics, computational or engineering analysis, or statistics.
- Eight elective courses, at least five of which must be in Mechanical Engineering. Elective courses outside of engineering, science or mathematics must be approved by the student's advisor and advisory committee in advance. Courses that are specific for the Master of Engineering M.Eng. program, including ENGR 5311, 5312, and 5314, may not be used towards the Ph.D. degree.
- ME 6340 Graduate Seminar for at least six semesters enrolled in the Ph.D. program as a full-time student (part-time students must have attended and passed the ME 6340 course for a minimum of

two semesters during their one-year residency period). A student is required to attend at least five ME seminars during the semester to pass ME 6340.

- Fifteen GRAD 6950 course credits, as described in the Graduate Catalog.

#### Ph.D. following an M.S.

- Four Mechanical Engineering Ph.D. core courses in the student's area of. If the M.S. degree was obtained from the University of Connecticut and the student has already taken the four core classes, they may be replaced with four Mechanical Engineering elective courses.
- One advanced graduate course in mathematics, computational or engineering analysis, or statistics.
- Two elective courses. Elective courses outside of engineering, science or mathematics must be approved by the student's advisor and advisory committee in advance. Courses that are specific for the Master of Engineering M.Eng. program, including ENGR 5311, 5312, and 5314, may not be used towards the Ph.D. degree.
- ME 6340 Graduate Seminar for at least five semesters enrolled in the Ph.D. program as a full-time student (part-time students must have attended and passed the ME 6340 course for a minimum of two semesters during their one-year residency period). A student is required to attend at least five ME seminars during the semester to pass ME 6340.
- Fifteen GRAD 6950 course credits, as described in the Graduate Catalog.

If a student has completed equivalent courses in a well-established graduate program, they can apply for a waiver by petitioning the ME Department Head by the end of the first semester. If a waiver is granted, the student may substitute an equal or greater number of elective graduate course credits for the waived course credits. However, at least two of the required ME core courses must be taken at the University of Connecticut.

At most two independent study courses can be applied towards course work requirements and only one independent study course can be taken with the student's major advisor as instructor.

## Polymer Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science Polymer Program serves as the sole center in the State of Connecticut for graduate research and education programs focusing on polymer science and engineering. The program is a nationally and internationally recognized center of excellence for interdisciplinary research and education in the fields of polymer science and engineering. The program is dedicated to meeting the educational needs of its graduate and professional students; providing lifelong learning opportunities in the study of polymeric materials; to assisting Connecticut industry in developing polymer technology; and to expanding and disseminating the global knowledge base regarding polymeric materials.

#### Master of Science Program

Other than the GRE General Test scores, there are no special requirements for admission to the master's program beyond those of the Graduate School. Selection of Plan A (thesis) or Plan B (non-thesis) is made after consultation with the Advisory Committee. For Plan A, the student must successfully complete no fewer than 21 credit hours and no fewer than nine additional credits of Master's Thesis Research by taking GRAD 5950 or 5960, as well as the writing an oral defense of a thesis. For Plan B, the student must successfully complete no fewer than 30 credits of advanced course work and a comprehensive final examination, but no thesis is required.

#### Doctor of Philosophy Program

Admission to the doctoral program is based upon a careful assessment of the student's potential for creative research in polymer science. There are no special requirements for the doctoral program beyond those of the Graduate School, other than the GRE General Test scores.

**Requirements:** No fewer than 30 credit hours of advanced coursework, including POLY 5352, 5380, 5381, 5382, 5384, 6001; GRAD 6950 for at least 15 additional credits. The General Exam, which consists of two parts: a written portion and an oral portion. The written portion is a comprehensive cumulative four-part exam. The oral portion is the writing and oral defense of a dissertation proposal. The Doctoral Dissertation, which consists of two parts: a written dissertation, and an oral defense of the dissertation before a committee of faculty and the general public.

# School of Fine Arts

## Art (M.F.A.)

The Department of Art and Art History offers one graduate degree: Master of Fine Arts (M.F.A.). The M.F.A. degree, a terminal degree for studio artists, requires a minimum of three years study in residence. Graduate level studio work for the serious artist is desirable to enable intensive aesthetic experimentation assisted by the guidance of established professional artists. As a result of such experience, a student is expected to complete a body of art significant in content and of professional quality. Students develop a plan of study in consultation with a major advisor and advisory committee. While the program emphasizes individualized studies concentrating on and combining studio art in such areas as ceramics, drawing, painting, installation/performance art, photography, printmaking, sculpture, and video, there are courses that also enable students to engage other resources of the Department of Art and Art History and the University community.

#### M.F.A. Requirements

The M.F.A. requirements conform to the Graduate School requirements as outlined in the Academic Regulations section of this catalog. The M.F.A. has specific course requirements described below. Specific course requirements for the M.F.A. are determined by the student's advisory committee consistent with the minimum requirements specified by the Graduate School. The M.F.A. does not have a foreign language requirement. Students establish their own direction and goals in consultation with a major advisor and an advisory committee. After such consultation, the plan of study is completed for the approval of the student's advisory committee. Candidates for the M.F.A. are required to complete a minimum of 60 credits of graduate course work. This total typically includes 39 credits of graduate studio art distributed as follows: 18 credits in an area of major emphasis, 15 credits outside the area of major emphasis, and six credits of M.F.A. project. An additional 15 credits are to be taken in non-studio graduate art courses and are distributed as follows: nine credits of graduate art seminar, three credits in studio art instruction and curriculum planning, six credits in modern and contemporary issues in art, and three credits of special topics in art history. When deemed appropriate by the advisory committee, additional credits in advanced studio or art history may be required of students whose undergraduate backgrounds are deficient in these areas.

**Core Requirements:** ART 5310, 5320, 5340, 5383; ARTH 5383, 5370; Graduate Studio Art course in Major Studio Area; Graduate ART course or Elective Area.

**M.F.A. Project Requirement.** ART 5397; Reserved for the last semester of study after candidacy review, the M.F.A. project requires accomplishment of a body of studio work culminating in a substantial exhibition for public viewing, supported by a written statement, public presentation, and a digital photographic portfolio. Each candidate presents to the advisory committee an oral defense of the completed body of studio work and the written statement. The exhibition emphasizes work resulting from the M.F.A. project and courses taken in the final year of study. A public presentation is required in conjunction with the exhibition.

## Arts Administration (M.F.A.)

The Master of Fine Arts (M.F.A.) in Arts Administration is offered through the Department of Dramatic Arts. The degree requires a minimum of 60 credits, and is designed to be completed in three years. The program is highly individualized and divided into two main parts; the core curriculum, which all M.F.A. students are required to take, and advanced research and training in each student's chosen area of expertise within the general field of Arts Administration. Examples of areas of specialization include: Fundraising and Development, Marketing, General Management, Labor Relations, Executive Leadership, Strategic Planning, Strategic Partnerships, Community Engagement, Advocacy, and Budgeting and Finance.

**Core Requirements:** DRAM 5110, 5111, 5112, 5113, 5114, 5115, 5116, 5117, 5118, 5120, 5121, 5122, 5123; FINA 3710; PP 5328; and six credits of electives.

## Digital Media and Design (M.F.A., M.A.)

The Digital Media and Design department offers two graduate degree programs: a Master of Fine Arts (M.F.A.) and a Master of Arts (M.A.). The department also offers an online graduate certificate.

### Master of Fine Arts (M.F.A.) in Digital Media and Design

The program is a customized, two-year graduate program where students work closely with dedicated faculty in the development of their own independent creative practice. The Digital Media and Design Department operates at the intersection of art, technology, industry, and science. The program is designed for the graduate student who has educational or career experience in digital media and design, giving them the opportunity to intensely pursue advanced education and research in their specific area of expertise, or in an interdisciplinary capacity drawing from more than one area within the digital media space. As part of the School of Fine Arts, Digital Media and Design faculty and students collaborate with the departments of Music, Dramatic Arts, and Art and Art History and also have the opportunity to engage in collaborative projects with creative research and industry partners. The M.F.A. in Digital Media and Design is a terminal degree intended to provide educational and career-training within an experiential learning environment. The program is structured to develop an in-depth understanding of digital media aesthetics, technology, practice, procedure, design, implementation and/or research techniques employed in the areas of Digital Art, Business, Digital Humanities/Social Sciences, STEM, and Entertainment. In addition to the standard materials, applicants to the M.F.A. degree must submit a digital portfolio through Slideroom showcasing the applicant's readiness to engage in advanced creative activity and research within one of the six DMD concentration areas or in an interdisciplinary capacity across the DMD concentrations.

**M.F.A. Requirements:** The Master of Fine Arts in Digital Media and Design requires a two-year commitment of full-time resident graduate study. A minimum of 60 graduate level credits are required to graduate. Of these 60 credits, required courses are: DMD 5001, 5010, and 12 credits of DMD 5015 (taken each semester of graduate residency for a total of four times); 18 credits from 5000-level DMD common courses; and six credits, approved by the student's major advisor, are taken outside the department in a coherent field of study; nine credits are taken in a combination of DMD 4081 or 5099; six credits of DMD 5075; and three credits of M.F.A. Thesis Exhibition.

**M.F.A Thesis Project.** Students must follow the M.F.A. Thesis Project - Process and Procedures departmental guidelines while developing the thesis project. This includes instructions for the formation of an M.F.A. Advisory Committee, submission of a thesis proposal, final examination and presentation of the thesis project, and thesis project documentation.

### Master of Arts (M.A.) in Digital Media and Design

The M.A. program is designed to provide a personalized and customized graduate experience for the student with little digital media education or experience. A student will work with his/her advisor to develop their plan of study and their independent studies. The M.A. provides graduate students with the foundational digital media strategies, skills, and tools to pivot and pursue a career in digital media. The program is structured to develop a focused understanding of digital media aesthetics, practice, procedure, technology, design, implementation and/or research techniques within a targeted commercial or creative area including: Digital Arts, Business, Digital Humanities/Social Sciences, STEM, and Entertainment.

**M.A. Requirements:** The program of study for the M.A. requires one year of full-time resident graduate study. A minimum of 30 graduate level credits are required to graduate. Of these 30 credits, required courses are: DMD 5001 and 5010; 15 credits are selected from 5000-level DMD common courses; six credits are secondary field courses approved by the student's major advisor and taken outside the department in a coherent field of study; three credits of either DMD 4081 or 5099.

## Dramatic Arts (M.A., M.F.A.)

The Department of Dramatic Arts offers two graduate degrees: Master of Arts (M.A.) and Master of Fine Arts (M.F.A.). The M.A. degree may be awarded in Puppetry or Theatre History and Criticism. The M.F.A. degree may be awarded either in Acting, Design, Directing, Puppetry or Technical Direction. The M.A. and M.F.A. in Dramatic Arts are intensive degree programs designed to prepare individuals for the numerous careers in theatre. Our goal is to provide the finest professional training through classroom and studio instruction. To enrich the real-world training, students are provided maximal opportunities to obtain professional level production experience through active participation in plays produced by its theatre production

arm, the Connecticut Repertory Theatre (CRT). Through a conservatory approach in a liberal arts setting, our students learn to perform, interpret and teach in all aspects of theatre in a rich learning environment that provides a broad education and intense training. UConn's M.F.A. in Dramatic Arts is accredited by the University Resident Theatre Association (URTA). The student's advisory committee determines specific course requirements for the M.A. and M.F.A. in Dramatic Arts, which are consistent with the minimum requirements specified by the Graduate School. In addition to the Graduate School requirements outlined in the Academic Regulations section of this catalog, the graduate programs in Dramatic Arts have additional requirements listed below.

**M.A. in Acting.** The M.A. in Acting requires a minimum of 30 credits, which are composed of a set of core acting-studio courses, electives, casting in Connecticut Repertory Theatre production and based on the student's previous study and experience, projecting intended personal goals and possible employment.

**M.F.A. in Acting.** The M.F.A. in Acting requires a minimum of 60 credits. The M.F.A. program is designed to be completed in three years, with students taking formal acting-studio courses in each of their six semesters, Casting in Productions at Connecticut Repertory Theatre and completion of the Acting NYC Showcase in their third year. Due to course sequencing, students are normally only admitted for the Fall semester.

**M.F.A. in Acting Core Requirements:** DRAM 5001, 5002, 5003, 5004, 5005, 5006, 5131, 5700, 5701, 5702, 5703, 5704, 5705, 5706, 5801, 5802, 5803, 5804, 5805, 5806, 5197, and 5192.

**M.F.A. in Design.** The M.F.A. in Design is an advanced, professional training in the areas of Costume Design, Lighting Design, Scenic Design, and Technical Direction, which requires a minimum of 60 credits. This M.F.A. program is designed to be completed in three years. Students are encouraged to take courses across all design disciplines and are expected to assist in designing at the Connecticut Repertory Theatre productions.

**M.F.A. in Design Core Requirements:** Costume Design: DRAM 5130, 5132, 5401, 5402, 5403, 5404, 5405, 5407, 5411, 5412, 5414, 5415, 5416, 5417, 5418, 5419, 5420, 5496; Lighting Design: DRAM 5130, 5132, 5500, 5501, 5502, 5503, 5504, 5509, 5515, 5516, 5596; Scenic Design: DRAM 5130, 5131, 5201, 5301, 5302, 5303, 5304, 5305, 5312, 5313, 5314, 5316, 5320, 5396; Technical Direction: DRAM 5131, 5200, 5201, 5202, 5204, 5205, 5206, 5207, 5208, 5209, 5211, 5212, 5213, 5296.

**M.F.A. in Directing.** The M.F.A. in Directing requires a minimum of 60 credits. The M.F.A. program is designed to be completed in three years. The program is highly individualized and aims to educate the student as creative artist, director and leader. To that end, in course and production work, emphasis is placed on developing the director's unique artistic imagination and mastery of collaborative leadership.

**M.F.A. in Directing Core Requirements:** DRAM 5130, 5131, 5132, 5159, 5197, 5192, 5200, 5329, 5612, 5700. Total number of hours includes supplemented courses taught elsewhere in the University if approved by students' advisers.

**M.A. in Puppetry.** The M.A. in Puppetry requires a minimum of 30 credits, which are composed of a set of core courses and electives based on the student's previous study and experience, projecting intended personal goals and possible employment.

**M.F.A. in Puppetry.** The M.F.A. in Puppetry program is focused on preparing the student for professional work in the Puppet Arts and requires a minimum of 60 credits. Classroom instruction offers the student practice in theory, history, conception, scripting, design, mechanics, fabrication with a variety of materials, and performance with different puppet types. Production work provides practical experience with performance styles, materials, and production development. The M.F.A. program is designed to be completed in three years.

**M.F.A. in Puppetry Core Requirements:** DRAM 5601, 5602, 5603, 5604, 5605, 5607, 5608, 5609, 5610, 5611, 5612, 5613, 5614, 5615, 5616, 5617, 5618, 5619, 5620, 5696.

**M.F.A. in Technical Direction.** The M.F.A. in Technical Direction is an advanced, professional training in technical production areas associated with the performing arts which requires a minimum of 60 credits. The program emphasizes planning and management and focuses on methods of investigating and applying new techniques, materials and technologies to the

technical management and execution of productions. This M.F.A. program is designed to be completed in three years. Students are encouraged to take courses across all design disciplines and are expected to assist in designing at the Connecticut Repertory Theatre productions.

**M.F.A. in Technical Direction Core Requirements:** DRAM 5131, 5200, 5201, 5202, 5204, 5205, 5206, 5207, 5208, 5209, 5211, 5212, 5213, 5296.

**M.A. in Theatre History and Criticism.** The M.A. in Theatre History and Criticism requires a minimum of 30 credits, which is based on a core of required courses, which emphasize the interrelatedness of theory, history, and applied criticism. Each M.A. in Theater History and Criticism student plans an individual course of study and must complete at least 30 semester hours of course work.

**M.A. in Theatre History and Criticism Core Requirements:** DRAM 5131, 5132, 5159, 5197, 5192, 5329, 5612. Total number of hours includes supplemented courses taught elsewhere in the University if approved by students' advisers.

## Music (M.Mus., M.A., D.M.A., Ph.D.)

The Department of Music offers four degrees: Master of Music (M.Mus.), Master of Arts (M.A.), Doctor of Musical Arts (D.M.A.), and Doctor of Philosophy (Ph.D.). The Department of Music also offers a Performer's Certificate. The M.Mus. and D.M.A. degrees may be awarded in Performance or Conducting. The M.A. degree may be awarded in Historical Musicology or Music Theory. The Ph.D. may be awarded in Music Theory and History. The M.Mus. and M.A. degrees prepare students for teaching at public and private institutions, including some college and university-level teaching as well as for further study at the doctoral level. The D.M.A. and Ph.D. degrees prepare students for college and university teaching, performance, and/or research. In addition to the Graduate School requirements outlined in the Academic Regulations section of this catalog, the graduate programs in Music have the following requirements.

### M.Mus. and M.A. Requirements

Satisfactory completion of at least 30 credits is required for the M.Mus. degree, and at least 33 credits for the M.A. degree, with a minimum GPA of 3.0 required for students in either program. Students in the M.Mus. and M.A. programs are required to take MUSI 5302 and 5391. Students in the M.Mus. program are required to present one recital, MUSI 5397. Students in the M.A. program are required to submit a thesis that represents an original contribution to research in the field and must demonstrate reading knowledge of at least one foreign language. All Master's degree students must also pass a comprehensive oral Master's Degree Final Examination. Additional discipline-specific course requirements are listed below.

**M.Mus. in Performance Requirements:** MUSI 5323 for 14 credits, Music Electives (Music History, Theory, or Literature) for three credits, and six credits of other electives. Students with an emphasis in voice must demonstrate proficiency in foreign languages and diction.

**M.Mus. in Choral Conducting Requirements:** MUSI 5305 for two credits, 5323 (conducting) for three semesters (six credits total), 5323 or 3222 (secondary, voice or piano) for two credits, 5330, 5365, 5366, 5367; One course from: MUSI 6411, 6412, or 6413; Electives for two credits. In addition, students are expected to participate in MUSI 5331 each semester of residence.

**M.Mus. in Instrumental Conducting Requirements:** MUSI 5305 for two credits, 5323 for six credits, 5364, 5372, 5373; one course from: MUSI 6411, 6412, or 6413; Electives for four credits. In addition, students are expected to participate in MUSI 5331 each semester of residence.

**M.A. in Historical Musicology Requirements:** MUSI 5319, 5348, 5353, 5354, 5379, 6411, 6412, 6413; Electives for three credits; GRAD 5950 for nine credits. In addition, attendance and participation in the Music History/Theory Colloquium is expected during each semester of residence.

**M.A. in Music Theory Requirements:** MUSI 5354; two courses from: MUSI 5348, 5353, 5356, 5359, 5379 for six credits total; two courses from: MUSI 6411, 6412, or 6413 for six credits total; Electives for three credits; GRAD 5950 for nine credits. In addition, attendance and participation in the Music History/Theory Colloquium is expected during each semester of residence.

### D.M.A. and Ph.D. Requirements

The D.M.A. and Ph.D. degrees each require satisfactory completion of at least 60 credits, with a minimum GPA of 3.0 required for students in either program. Students in the D.M.A. and Ph.D. programs are required to take MUSI 5391. Students in both doctoral programs must demonstrate reading knowledge of at least one foreign language and must pass the Doctoral General Examination. Following the Doctoral General Examination, students are required to submit a dissertation proposal for approval by the student's Advisory Committee, the Graduate Studies Committee of the Department of Music and by the Graduate School. Upon completion of the dissertation, which must present an original contribution to research in the field, students are required to present and pass a Doctoral Dissertation Defense, which includes an oral final examination by the student's Advisory Committee. Additional discipline-specific course requirements are listed below.

**D.M.A. in Performance Requirements:** MUSI 5323 for four semesters (16 credits total); four semesters of ensemble, chosen from: MUSI 5305, 5324, or 5325 for four credits; Theory or History minor, with four courses chosen from: MUSI 5302, 5319, 5348, 5353, 5354, 5356, 5359, 5379, 6411, 6412, or 6413 for 12 credits total; Directed Electives for seven credits (in consultation with the Major Advisor and the Advisory Committee); MUSI 5397 three recitals (three credits total); GRAD 6950 for 15 credits.

**D.M.A. in Conducting Requirements:** MUSI 5323 for four semesters (16 credits total); two semesters of ensemble (observer/assistant conductor role, two credits each semester) registered under MUSI 6400 Tutorial (four credits total); Theory or History minor, with four courses chosen from: MUSI 5302, 5319, 5348, 5353, 5354, 5356, 5359, 5379, 6411, 6412, or 6413 for 12 credits total; Directed Electives for seven credits (in consultation with the Major Advisor and the Advisory Committee); MUSI 5397 one recital (one credit) plus two (non-credit) large ensemble conducting appearances; GRAD 6950 for 15 credits. In addition, students are expected to participate in MUSI 5331 during each semester of residence.

**Ph.D. in Music Theory and History Requirements:** MUSI 5302, 5319, 5348, 5353, 5354, 5359, 5379, 6411, 6412, 6413, 6491; Directed Electives for nine credits (in consultation with the Major Advisor and the Advisory Committee); GRAD 6950 for 15 credits. In addition, attendance and participation in the Music History/Theory Colloquium is expected during each semester of residence.

# College of Liberal Arts and Sciences

## Anthropology (M.A., Ph.D.)

The Department of Anthropology offers two graduate degrees: Master of Arts (M.A.) and Doctor of Philosophy (Ph.D.).

**Requirements:** The M.A. and the Ph.D. requirements in Anthropology conform to the Graduate School requirements as outlined in the Academic Regulations section of this catalog. Specific course requirements for the M.A. and Ph.D. in Anthropology are determined by the student's advisory committee consistent with the minimum requirements specified by the Graduate School.

## Applied Biochemistry and Cell Biology (M.S.)

The Master of Science in Applied Biochemistry and Cell Biology is a professional master's degree intended to provide students with a comprehensive education in Biochemistry and Cell Biology. By combining coursework, internships and advanced laboratory training, this program prepares students for employment in the biotechnology, pharmaceutical, diagnostic, government, and academic sectors.

**Requirements:** A minimum total of 33 credits, an internship and passing an exit examination. Students are required to take 19 credits of core conceptual courses, plus any combination of eight credits of Practical Coursework Options (including workshops, laboratory or research courses) six credits of professional master's cohort courses (communication skills, Frontiers seminars, business practices, internship). Students must complete GRAD 5900; MCB 5490; and two credits of MCB 5491. Courses are periodically modified to reflect new offerings or changing scientific emphasis.

**Conceptual Courses.** A total of 19 credits. MCB 3211, 3219, 4026W, 4211, 5003, 5008, 5012, 5014, 5200, 5210, 5217, 5240, 5250, 5255, 5280, 5299, 5454, 5471, 5681, 5895; PHAR 5471, 5472, 6455; PHRX 3001; PNB 3260; or another course with prior approval from the Applied Biochemistry and Cell Biology Program Director.

**Practical Coursework Options.** Eight credits required. A course in bioinorganic chemistry; MCB 5427, 5430, 5670, 5671, 5672, 6897; MCB 5896 when taught as: Introduction to Flow Cytometry, Introduction to Microscopy, Practical Applications of Cell Culture, Multimode Plate Reader, or Characterization of Macromolecules; or another course with prior approval from Applied Biochemistry and Cell Biology program director.

**Professional Master's Cohort Courses.** A minimum of 6 credits required. MCB 5490, 5491, or MCB 5896 with topic of Frontiers in Drug Discovery; GRAD 5900 when taught as Professional Writing and Communication Skills, GRAD 5910, 5930; or another course with prior approval from Applied Biochemistry and Cell Biology program director.

Note: Only six credits total of 3000 and 4000 level courses may be applied to the graduate degree.

## Applied Financial Mathematics (M.S.)

The Master of Science in Applied Financial Mathematics is a professional degree that focuses on rigorous mathematical modeling in finance, investment and risk management to prepare a graduate for analytic work across a wide spectrum of the financial services industry. It includes a practical component often fulfilled by an internship. The Master of Science in Applied Financial Mathematics with concentration in Actuarial Science includes a component of study directed towards actuarial science.

### Applied Financial Math (MSAFM)

Students pass five core courses, MATH 5600, 5620, 5650, 5660 and STAT 5361; pass at least two finance focused courses from ACCT 5327; FNCE 5202, 5504, 5512, 5532, 5533, 6201, 6203 and MATH 5661; pass at least six credits of practicum courses from GRAD 5900; MATH 5600, 5661, 5670, 5671 and 5850 with at least one of these credits in MATH 5850 for an internship. The remaining courses must be chosen from a list of elective courses approved by the department. In addition, the student is required either to pass an Exit Project or to pass two Society of Actuaries examinations. The format and structure of the exit project is determined by

the student in collaboration with their advisor and must be approved by the advisor. The actuarial examinations may be passed prior to admission.

**Applied Financial Math (MSAFM) with concentration in Actuarial Science.** The MSAFM with concentration in Actuarial Science has the same requirements as the MSAFM degree except the student is only required to take one finance focused course and must take at least one advanced actuarial course from MATH 5630, 5631, 5637, 5638, 5639, 5640 and 5641.

## Applied Genomics (M.S.)

The Master of Science in Applied Genomics is a professional science master's program designed to take advantage of the rapidly advancing area in genomics and train students for employment in the biotechnology, pharmaceutical, diagnostic, government, and academic sectors. This is achieved by combining coursework with advanced laboratory training and internships.

**Requirements:** At least 33 credits of course work, an internship and passing an exit examination. Credits are selected from an approved menu of courses as follows: 18 credits in conceptual course options, eight credits in practical coursework (laboratory or research experience) and seven credits in professional master's cohort courses (communication skills, Frontiers seminars, business practices, internship). Students are also required to complete GRAD 5900; MCB 5490; and two credits of MCB 5491. Courses are periodically modified to reflect new offerings or changing scientific emphasis. In special circumstances the Advisory Committee may waive some of these requirements.

**Conceptual Course Options.** A minimum of 18 credits from MCB 3211, 4211, 4219, 4416, 5210, 5217, 5240, 5299, 5426, 5445, 5452, 5454, 5471, 5681, MCB 5896 when taught as Concepts of Genetic Analysis; MCB 5899; EEB 5333, 5348, 5349, 5449; KINS 6094 when taught as Inherited Metabolic Disorders; PHAR 4000, 5471, 5472, 6455, PHAR 6484; PLSC 3230; PNB 3260, 5390, 5396; STAT 5005, 5315; or another course with prior approval from the Applied Genomics Program Director.

**Practical Coursework Options.** A minimum of eight credits from MCB 5427, 5430, 5670, 5671, 5672, 6897; or another course with prior approval from the Applied Genomics Program Director.

**Professional Master's Cohort Options.** A minimum of seven credits from GRAD 5900 when taught as Professional Writing and Communication Skills; GRAD 5910 when taught as Genomics and Life Sciences; GRAD 5930; MCB 5480, 5490, 5491; or another course with prior approval from the Applied Genomics Program Director.

Note: Only six credits total of 3000 and 4000 level courses may be applied to the graduate degree.

## Applied Microbial Systems Analysis (M.S.)

The Master of Science in Applied Microbial Systems Analysis is a professional science master's program that trains students in microbial genomics, microbiome research and general microbiology. This program is specifically designed to train students for employment in the biotechnology, pharmaceutical, diagnostic, government, and academic sectors. This is achieved by combining coursework with advanced laboratory training and internships.

**Requirements:** At least 33 credits of course work, an internship and passing an exit examination. Credits are selected from an approved menu of courses: minimum of nine credits in core curriculum options, minimum of eight credits in specialized microbiology courses (laboratory or research experience), minimum of five credits in laboratory courses and minimum of seven credits in professional master's cohort courses (communication skills, Frontiers seminars, business practices, internship). Students are also required to take GRAD 5900 when taught as Professional Writing and Communication; MCB 5490; and two credits of MCB 5491. Courses are periodically modified to reflect new offerings or changing scientific emphasis. In special circumstances the Advisory Committee may waive some of these requirements.

**Core Curriculum Course Options.** A minimum of nine credits from MCB 4601, 5001, 5217, 5240, 5426, 5471, 5621, 5679, 5699; or another course with prior approval from the Microbial Systems Analysis Program Director.

**Specialized Microbiology Course Options.** A minimum of eight credits from ANSC 4341, 5618; EEB 5349, 5449; MCB 5472, 5636, 5681; PVS

5201, 5202, 5203, 5401, 5632; or another course with prior approval from Microbial Systems Analysis Program Director.

**Laboratory Course Options.** A minimum of five credits from ANSC 4642; MCB 3637, 5427, 5430, 5670, 5671, 5672, 5616; one to six credits of MCB 6897; or another course with prior approval from the Microbial Systems Analysis Program Director.

**Professional Master's Cohort Course Options.** A minimum of seven credits from GRAD 5900 when taught as Professional Writing and Communication Skills; GRAD 5910; GRAD 5930 internship; MCB 5080, 5490, 5491; or another course with prior approval from Microbial Systems Analysis Program Director.

Note: Only six credits total of 3000 and 4000 level courses may be applied to the graduate degree.

## Biodiversity and Conservation Biology (M.S.)

The M.S. in Biodiversity and Conservation Biology is the graduate portion of an integrated undergraduate and graduate degree program, the Joint B.S.-M.S. in Biodiversity and Conservation Biology. The M.S. portion is a non-thesis, course work based (Plan B) master's degree; it requires a minimum of 30 credits, comprising at least 14 credits of core course work, at least six credits of related area courses, at least four credits of research, and one to nine credits of internship. No more than six credits of undergraduate coursework may be counted towards the degree.

**Core Courses:** EEB 5301, 5310, 5369, 5370; EEB 5348 or 5449; and EEB 5347 or one of the following taxonomic diversity courses: EEB 3266, 4250, 4252; EEB 4260 and 4261; EEB 4272, 4274, 4275, 5200, 5204, 5220, 5240, 5250, 5254, 5265, 5271, or 5477.

**Related Areas.** Students must complete a course from any two of the following related areas: Environmental Policy, Ethics and Management; Environmental Economics, and Environmental Analysis. Advisory committees may approve alternative courses within these three related areas.

**Environmental Policy, Ethics, and Management Course Options:** ARE 3434; EVST/POLS 3412; GEOG 4210; NRE 3155, 3245, 4165, 4335, 5200, 5345; PHIL 3216; SOCI 3407.

**Environmental Economics Course Options:** ARE 4438, 4462, 5464.

**Environmental Analysis Course Options:** ARE 3464; GEOG 3505, 5500, 5510; NRE 3535, 4535, 4665, 5205, 5215, 5575, 5585.

**Research and Internship Credits.** Research credits are earned by completing one or more sessions of EEB 5889. Internship credits are earned by completing one or more sessions of EEB 5891, possibly in conjunction with sessions of EEB 5881.

## Biostatistics (M.S.)

The Department of Statistics offers programs leading to a Professional Master of Science (M.S.) degree in Biostatistics (as well as Master of Science and Doctor of Philosophy (Ph.D.) degrees in Statistics, described elsewhere). The M.S. in Biostatistics requires 31 credits. Qualified fulltime students are expected to complete the program in three to four semesters. The program focuses on practical skills and rigorous training in modern areas of biostatistics to solve problems in public health, health services and policy, biomedical research, and other areas such as environmental health and ecology. Students completing this program successfully will acquire expertise in topics including statistical inference, regression analysis, design and analysis of clinical trials and epidemiological studies, bioinformatics, programming in SAS and R, data management, and consulting. Individuals with a Bachelor's degree in any major who have a background in mathematics and statistics are encouraged to apply.

**Required Courses:** BIST 5099, 5215, 5225; BIST 5505–5605; BIST 5515; BIST 5585–5685; BIST 5625, 5725.

**Required Electives:** One of the following courses: BIST 5635, 5645, or 5655. One additional course: BIST 5361, 5525, 5535, 5635, 5645, 5665, 5725, 5825 or BIST 6494 when taught as Bayesian Data Analysis, Bioinformatics, Categorical Data Analysis, Longitudinal Data Analysis, or Environmental Statistics. The final requirement is passing the Master's Examination which is a written test on basic understanding of course materials. There is no thesis requirement.

Note: In order to be considered for a possible switch to the Ph.D. program or for financial support, a Professional M.S. in Biostatistics student must first clear the Master's Examination, and then clear the Ph.D. Qualifying Examination.

## Chemistry (M.S., Ph.D.)

The Department of Chemistry offers two graduate degrees: Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). Students engage in coursework and conduct chemistry-related research that prepares them for careers in fields such as academia, industry, and government. Faculty and students in the Department of Chemistry participate in active research programs encompassing modern aspects of analytical, biological, environmental, inorganic, organic, physical, and polymer chemistry.

### Master of Science Degree

A master's degree may be earned under either of two plans (Plan A or Plan B) as determined by the Advisory Committee. Plan A requires at least 21 hours of course work (plus nine credits of GRAD 5950) and a written thesis describing original research in chemistry. The coursework must include at least three credit hours of independent study carrying out laboratory work or theoretical research. The Advisory Committee must approve the topic and scope of the master's thesis. For students interested in a career in chemical research, the Department strongly recommends following Plan A. Plan B requires 30 credits of course work but no thesis. The Advisory Committee determines the courses to be taken and may require more than the minimum number of credits.

### Doctor of Philosophy Degree

The primary requirement for the Ph.D. degree is submission of a dissertation that makes a significant contribution to the candidate's field of specialization. The requirements for the Ph.D. in Chemistry are as follows:

**Required Courses:** A minimum of 30 course credits of graduate work beyond the Bachelor's degree, in addition to 15 credits of GRAD 6950, required by the Graduate School. The Graduate Faculty of Chemistry may require specific courses based on the student's proficiencies and areas of focus. The Department encourages extensive work in the major area and at least nine credits in a non-major area (usually chemistry but also areas such as biochemistry, chemical engineering, pharmacy, physics, and mathematics). It is most common for 21-27 course credits to be required beyond the Master's degree, unless a student earns a Master's degree in this Department as a step toward the Ph.D. In the latter case, all graduate credits may count toward the minimum of 30 course credits for the Ph.D., if approved by the Advisory Committee.

**General Examination.** After qualification, the student must pass the General Examination, consisting of a written and an oral portion as determined by his or her selected division (Analytical, Biological, Environmental, Inorganic, Organic, Physical, or Polymer). The General Examination is generally completed during the second or third year of graduate work.

**Dissertation Prospectus.** A Dissertation Prospectus must be filed with the Graduate School at least six months before submission of the dissertation, but preferably much earlier.

## Communication (M.A., Ph.D.)

The Department of Communication studies the process and analysis of human communication, with areas of specialization that include interpersonal communication, persuasion, communication technology, nonverbal communication, and media effects. The Department offers both a Master of Arts (M.A.) and a Doctor of Philosophy (Ph.D.) in Communication. The M.A. program in Communication emphasizes the scientific investigation of human communication behavior, stressing developments in communication theory and research as they relate to society and the communication process. The M.A. in Communication prepares people for entry into a number of fields that require analysis of communication situations. It also provides a solid foundation for Ph.D. work. The Ph.D. program in Communication offers students a unique curriculum that stresses the integration of theory and research in communication. Our program places strong emphasis on communication theory and a wide range of research skills and is designed to provide students with a rigorous course of study that will prepare them for careers in the academic, commercial, or non-profit spheres. Because

our program emphasizes a balance between theory and application, alumni leave UConn with a dynamic skill and knowledge set, qualifying them for employment opportunities both inside and outside academia.

### **Master of Arts in Communication**

All students must complete at least 33 credit hours of graduate course work, including a core of required courses. Required core courses are COMM 5001 and 5002. Core courses may only be waived in special circumstances. Students opting to write a thesis must also take COMM 5003 and 5010. The M.A. program has three tracks: Communication Theory, Marketing Communication, and Organizational Theory. The remainder of the student's program will be determined by the track selected. Students must culminate their M.A. program by either writing a thesis or taking a comprehensive examination.

### **Doctor of Philosophy in Communication**

The required credit hours and time required for completion for the Ph.D. program will differ depending on the degree status of entering students and the graduate level courses already completed by the student. Most tracks require that students complete 66-69 credit hours, which includes dissertation credits, though credit requirements may be reduced for students entering the program with a Master's degree in Communication or a related area. Required coursework varies depending on the above information and chosen track, but all students must complete several core courses. Core courses are COMM 5001, 5002, 5003, 5010, and 6001. Core courses may only be waived in special circumstances. The Ph.D. program has six tracks: Interpersonal Communication, Marketing Communication, Mass Communication, New Communication Technology, Nonverbal Communication, and Persuasion. As part of each track, students will take nine credits in an area chosen to provide breadth or specialized skills. Ph.D. students must pass the Methods Examination during their fourth semester to move onto more advanced coursework. Students must pass COMM 6800, which entails participating in two research projects mentored by faculty, prior to taking their comprehensive examinations. After coursework is completed, students must take and pass the doctoral comprehensive examinations in communication theory and research methods. After passing both examinations, students must successfully defend their dissertation proposal. Students culminate their Ph.D. program by submitting and successfully defending their doctoral dissertation.

### **Ecology and Evolutionary Biology (M.S., Ph.D.)**

The Department of Ecology and Evolutionary Biology offers two graduate degrees: Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). The M.S. degree may be awarded either in Biodiversity and Conservation Biology or in Ecology and Evolutionary Biology. The M.S. in Biodiversity and Conservation Biology is a coursework-based degree, incorporating internship and research experiences. It is aimed at students pursuing careers in biodiversity management, conservation, and environmental education. The M.S. in Ecology and Evolutionary Biology may be either a coursework-based degree or a research-based master's degree. Many students completing the research-based degree choose to pursue a Ph.D., while others pursue careers with state, local, or federal governments, with non-profit organizations and private companies, and as science teachers. The Ph.D. in Ecology and Evolutionary Biology prepares students for research and teaching careers in ecology and evolutionary biology, including research and leadership positions with non-profit organizations, private foundations, and state, local, or federal government agencies.

#### **Requirements for M.S. and Ph.D. in Ecology and Evolutionary Biology**

Specific course requirements for the M.S. and Ph.D. in Ecology and Evolutionary Biology are determined by the student's Advisory Committee consistent with the minimum requirements specified by the Graduate School. The Ph.D. in Ecology and Evolutionary does not have a related area or foreign language requirement, unless one is specified by the Advisory Committee. In addition to the Graduate School requirements outlined in the Academic Regulations section of this catalog, all M.S. students in Ecology and Evolutionary Biology must pass an oral final examination, and all thesis-based M.S. students must give a public oral presentation of their research prior to the final examination.

### **Economics (M.A., Ph.D.)**

The Department of Economics offers a Ph.D. degree in Economics. In addition, matriculated students are able to earn a Master of Arts (M.A.) degree in economics, although the Department does not admit students to the University specifically for this purpose. Students interested in pursuing a master's degree related to economics as their primary graduate program are encouraged to apply to the Department's stand-alone Master of Science in Quantitative Economics (MSQE) program. The Ph.D. program in Economics prepares students for research and teaching careers, as well as careers in the public or private sectors that require knowledge and understanding of the most advanced economic theory and methods. Ph.D. students specialize through courses in particular fields of study within economics, such as labor economics, macroeconomics, industrial organization, environmental economics, econometrics, and development economics. The M.A. program provides training in economic theory and methods, combined with elective courses that apply the core training in a variety of contexts. It is designed for students pursuing advanced degrees in other programs at the University who want to combine their other studies with a masters-level understanding of economics, or for Ph.D. students in economics who wish to earn a master's degree as part of their graduate studies or in lieu of completing the Ph.D.

#### **Master of Arts**

The M.A. program is a non-thesis degree. It requires satisfactory completion of at least 30 credits maintaining at least a "B" average. Of these 30 credits, 15 must come from required M.A. core courses and 15 or more are from elective credits approved by the student's major advisor. The required core courses for the M.A. degree are: ECON 5201, 5202, 5301, 5311, and 5312. Students can also meet core M.A. requirements by taking comparable higher level courses.

#### **Doctor of Philosophy**

The Ph.D. program is designed to be completed in four to five years, with the first three years focused on coursework and the final one to two years on research and completion of the dissertation. Due to course sequencing, students are normally only admitted for the Fall semester. The requirements for the Ph.D. in Economics are as follows:

**Required Ph.D. Core Courses:** ECON 6201, 6202, 6211, 6212, 6301, 6310, 6311 and 6312. In addition, Ph.D. students must satisfactorily complete at least five field courses, including at least one two-course sequence of designated field courses in one of the following fields: labor economics, macroeconomics and money, industrial organization, and environmental and natural resource economics. At least two of the other field courses must be 6000-level. All three must be taught courses (i.e., not independent studies), and at least two of these three field courses must be in Economics. Students must earn an average grade of at least "B" in these five field courses.

**Seminar/Presentation Requirement.** Students in years two through five must satisfactorily complete a section of ECON 6494 each semester, including the seminar's presentation requirement(s). This requirement can be waived during some semesters, if a waiver is deemed to be in the student's academic interest.

**Preliminary Examinations:** Ph.D. students are required to sit for the Preliminary Examinations in both microeconomics and macroeconomics following their first year in the Ph.D. program and pass both parts of the examination within two attempts.

**Third Year Research Paper:** Students must complete a paper that meets the requirements of the Third Year Research Paper before the end of their third year in the Ph.D. program.

**Dissertation Proposal:** Each student must successfully defend a dissertation proposal, normally by the end of the fourth year in the program.

**Foreign Language/Related Area:** The Economics Ph.D. program does not have a foreign language or related area requirement.

## Energy and Environmental Management (M.S.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources and the College of Liberal Arts and Sciences.*

The Master of Energy and Environmental Management (MEEM) program offers a Master of Science (M.S.) degree through an interdisciplinary partnership involving the Department of Natural Resources and the Environment, Department of Geography, School of Law, and Center for Environmental Sciences and Engineering. The MEEM is designed for college graduates looking for advanced study in energy and environmental management fields, and working professionals looking to enhance their skills and knowledge in science, management, and policy.

### Master of Science Requirements

The MEEM requires 27 credits of coursework and three credits of internship or practicum, for a total of 30 credits. The MEEM generally takes 18 to 24 months to complete and conforms to the Graduate School requirements for a Plan B Non-thesis Master's Degree.

**Required Courses:** NRE 5200, 5220; LAW 7812; and a three-credit Internship or Practicum course.

**Elective Courses:** Includes 18 credits drawn from the following specialty areas (each of which constitutes a stand-alone graduate certificate program).

**Sustainable Environmental Planning and Management course options:** NRE 5205, 5210, 5585, 5200\*, 5220\*; GEOG 5100, 5130, 5230, 5390, 5500, 5505, 5510, 5520, 5530, 5600, 5610, 5810; NRE 4535, 5575.

**Energy and Environmental Law:** LAW 7568, 7600, 7650, 7656, 7721, 7758, 7784, 7805, 7806, 7842, 7812\*.

\*Required courses for the Master of Energy and Environmental Management are listed under electives only for illustrative purposes of content under each graduate certificate program. Required courses will not count towards elective course requirements.

## English (M.A., Ph.D.)

The English Department has three graduate programs: Master of Arts degree (M.A.), Master of Arts Degree/Doctor of Philosophy (M.A./Ph.D.) and Doctor of Philosophy (Ph.D.). The M.A. program is for students who wish to pursue the M.A. degree but do not intend to go on for a Ph.D. Full-time students will be funded for two years.

### Master of Art Requirements

Students are normally expected to complete the Master's degree within two years. Students complete 32 credits, usually in this pattern: eight credits in the first semester (ENGL 5100, Theory and Teaching of Writing, three credits, ENGL 5182: Practicum in the Teaching of Writing, one credit and ENGL 5150: Research Methods, one credit, plus another three-credit course); nine credits in the second semester; six credits in the third semester; and nine credits in the fourth semester.

**Required Courses:** ENGL 5100, 5182, 5150; one course in theory (literary, cultural, rhet/comp) ENGL 5500, 6500, or another approved course; one course in literature in English before 1800; and one course in literature in English after 1800. In addition, students must complete a final writing project in the second year, consisting of a revision of a seminar paper as a professional article, between 7000 and 8000 words, undertaken in consultation with an appropriate faculty advisor. (An independent study to revise the paper cannot be counted toward the coursework requirements for the degree). The deadline for the submission of the final writing project is March 1. Final writing projects will be evaluated by the M.A. Committee.

### M.A./Ph.D. Requirements

M.A./Ph.D. students who enter the program with a B.A. degree should be completed in six years. Students normally enroll in coursework for three years beyond the B.A. Work for the doctor of philosophy degree must be completed within eight years of the beginning of the student's matriculation. Students are required to complete 47 credits of course work at the University of Connecticut for the M.A./Ph.D. including the 15 mandatory GRAD 6950 research credits. The usual course load for a full-time student in each semester is between six and nine credits (if the student is a teaching assistant).

**Required Courses:** ENGL 5100, 5182, 5150, 5160; one course in theory (literary, cultural, rhet/comp) ENGL 5500, 6500 or another approved course; one course in literature in English before 1800; one course in literature in English after 1800.

### Ph.D. Requirements

Ph.D. students who enter with an M.A. degree are funded for five years. Students normally enroll in coursework for two years beyond the M.A. Work for the doctor of philosophy degree must be completed within eight years of the beginning of the student's matriculation. Students are ordinarily required to complete 24 credits of course work at UConn for the Ph.D., and at least 39 credits total of graduate work including the 15 mandatory GRAD 6950 credits. Requirements for the doctoral degree should be completed in five years for Ph.D. students (those entering with an M.A.)

**Required courses:** ENGL 5100, 5182, 5160; one course in theory (literary, cultural, rhet/comp) ENGL 5500, 6500 or another approved course; one course in literature in English before 1800; one course in literature in English after 1800.

Students who feel they have fulfilled any of the requirements listed above (at another institution) may petition the graduate program office to have those requirements waived at the University of Connecticut.

## Genetic Counseling (M.S.) \*

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, and UConn Health.*

The Department of Allied Health Sciences under the umbrella of the College of Agriculture, Health and Natural Resources and the Institute for Systems Genomics offers a Master's Degree in Genetic Counseling. This degree program provides innovative and interprofessional training for tomorrow's leaders in the translation of genomics and precision medicine. With the availability of NextGenCT training facilities on the UConn campuses, students will learn the technological advances they will later need to understand and interpret for their patients and communities. Skills development in scientific communication, ethical considerations, clinical applications, literature appraisal, and leadership assures graduates are effective, productive, and compassionate professionals. The program is not offered on a part-time basis and includes required summer components. Courses and training take place on the Storrs and Farmington campuses and online. Practical training requires travel to external affiliated hospitals, centers and clinics across Connecticut (transportation may be available in some instances).

### Master of Science Requirements

Except in special cases, genetic counseling students will complete required coursework and clinical rotations within 24 months. The successful graduate student will have established a three-faculty member Advisory Committee and completed the requisite total number of academic credits predetermined by program administration inclusive of course work, laboratory training, professional development, clinical rotations and a capstone project as outlined in a plan of study. In addition, M.S. in genetic counseling candidates will have accumulated sufficient logbook cases for the American Board of Genetic Counseling examination eligibility.

Specific course requirements are determined by both program leadership and the student's advisory committee consistent with requirements specified by the Graduate School. The typical plan of study includes conceptual coursework, laboratory training, professional development and practical coursework (clinical rotation experience). Didactic and practical courses are predetermined by program administration. Electives may be selected from a menu of options in consultation with the students' academic advisor and advisory committee. The plan of study has been designed based on domains needed to gain mastery in the body of knowledge of the field of genetic counseling. Coursework is selected to assure students can apply knowledge of genetic principles and genomic technologies to improve quality of health-care through the diagnosis, screening, intervention or prevention of disease and the maintenance of health. The exit examination timing and format are determined and designed by the Advisory Committee to reinforce the discipline-specific competency and provide an evaluation tool for relevant problem-solving abilities.

The Genetic Counseling curriculum meets the Accreditation Council for Genetic Counseling (ACGC) requirements in that student training supports

the 22 practice-based competencies within four domains: Genetics Expertise and Analysis; Interpersonal, Psychosocial and Counseling Skills; Education, and Professional Development and Practice. A content component common to all health professions lies in both public health and the ethical, legal, social implications of genetics.

\* This program is not accepting applicants at this time.

## Geography (M.A., Ph.D.)

The Department of Geography offers programs leading to two graduate degrees: Master of Science (M.A.) and Doctor of Philosophy (Ph.D.). (The department also offers a Graduate Certificate in Geographic Information Systems). The M.A. can be earned in course-intensive programs and in programs requiring evidence of meaningful research in the form of a thesis. It provides students with sufficient skills to be successful in private industry, government, and further graduate education. The Ph.D. in Geography provides students with an advanced understanding of theory and techniques required to execute significant research in the contemporary discipline of Geography. The Ph.D. is awarded only after the successful completion of a series of comprehensive examinations and the successful defense of a doctoral dissertation that makes a significant contribution to geographical research. The Ph.D. in geography provides its holders with opportunities for academic, government, and increasingly, private industry research positions.

**Requirements:** The M.A. and Ph.D. requirements in Geography conform to the Graduate School requirements as outlined in the Academic Regulations section of this catalog. Specific plans of study for each student's degree objective are determined in consultation with their advisory committees, and in conformance to the Graduate School requirements. Ph.D. plans of study must fulfill a foreign language requirement or have a related area of at least six credits of course work as designated by the student's advisory committee. Each graduate student normally takes GEOG 5000, 5010 and 6000 in the first year of study. Students can expect their programs to take two years for the M.A. and three to five years for the Ph.D., depending upon preparation and interests.

## Geological Sciences (M.S., Ph.D.)

The Center for Integrative Geosciences offers two graduate degrees in the field of Geological Sciences: Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). The M.S. in Geological Sciences may be either a coursework or research-based degree. The M.S. prepares students to pursue a Ph.D. or for careers in government, industry, teaching, or the non-profit sector. The Ph.D. prepares students for research and teaching careers in academia, as well as for research and leadership positions in government, industry, and the non-profit sector. Students may choose Geology or Geophysics as an area of concentration.

**Requirements:** The M.S. and the Ph.D. requirements in Geological Sciences conform to the Graduate School requirements as outlined in the Academic Regulations section of this catalog. All M.S. and Ph.D. students are required to pass GSCI 5000 (Geoscience Core Course); additional course requirements are determined by the student's advisory committee consistent with the minimum requirements specified by the Graduate School. There are no specific requirements for the areas of concentration beyond advisor approval.

## History (M.A., Ph.D.)

The University of Connecticut offers both the Master of Arts (M.A.) and the Doctor of Philosophy (Ph.D.) in History. Small seminars comprise the bulk of course work in both M.A. and Ph.D. programs to provide maximum interaction between faculty and students. Students may also design special courses with individual professors and take a limited number of advanced undergraduate courses.

### Master of Arts Requirements

The program is designed to give general training at the graduate level in preparation for doctoral study or work in schools, government service, law, or the private sector; it is broadly concerned with skills development (written and oral) and advanced learning. While the master's program does prepare students for entry into the doctoral program, it is equally aimed at enhancing the skills and historical perspective of teachers, museum and archive professionals, editors, lawyers, journalists, and others in the public

and private sectors. Upon admission to the program, the student is assigned a major advisor to chair an advisory committee. At least two associate advisors, chosen by the student, also serve on the committee. In consultation with this committee, the student plans a program that meets individual needs and satisfies the requirements of the Graduate School and the Department of History. This advisory committee will supervise the completion of either a thesis or a master's examination, depending on the option chosen by the student. Students elect one of two programs in pursuing the Master's degree. Both require a total of 30 credits.

**Plan A: Thesis Plan Requirements.** HIST 5101, 5102; nine credits or more of additional course work; nine credits of Master's Thesis Research (GRAD 5950 or 5960). Students may take up to six credits of 3000 level course work, with special permission. Up to six credits of independent studies HIST 5199 may be taken. In exceptional circumstances, students may petition the Graduate Advisory Committee for permission for additional independent studies. In addition, students must complete and successfully defend a master's thesis.

**Plan B: Non-thesis Plan Requirements.** HIST 5101, 5102 and 18 credits of additional coursework. Students may take up to six credits of 3000 level course work, with special permission. Up to six credits of independent studies HIST 5199 may be taken. In exceptional circumstances, students may petition the Graduate Advisory Committee for permission for additional independent studies. In addition, students must successfully pass a master's examination, usually in their fourth semester.

### Doctor of Philosophy Requirements

The objective of the Ph.D. in History program is primarily, though not exclusively, the training of academic scholars for college, university, and government service, with an additional focus on the practices of public history. Through a mixture of seminars, independent study, field examinations, language requirements, and a doctoral dissertation closely supervised by an advisor and faculty advisory committee, students develop the highest level of skills and command of information required for research scholarship and advanced teaching. Students will choose to focus their doctoral studies in a particular field, such as Medieval European, Early Modern and Modern European, United States, Latin American, Asian, or African history. Supporting work in other disciplines is recommended.

In order to develop teaching skills beyond the level of seminar presentations and oral examinations, Ph.D. students normally work as supervised teaching assistants and/or lecturers for several semesters. There are ongoing workshops on pedagogical techniques for all graduate assistants, and a required seminar on teaching history at the university level taken towards the end of coursework. By the time a student completes a Ph.D., they will normally have presented papers at scholarly meetings, written grant applications, submitted articles for publication, and engaged actively in teaching. Upon admission to the program, the student is assigned a major advisor to chair an advisory committee. At least two associate advisors, chosen by the student, also serve on the committee. In consultation with this committee, the student plans a program that meets individual needs and satisfies the requirements of the Graduate School and the Department of History. The major advisor who counsels the student through the general examination process ordinarily, but not necessarily, becomes the dissertation advisor. The amount of coursework required for the doctorate depends on whether students completed their M.A. at the University of Connecticut or another institution.\*

**Doctor of Philosophy Course Requirements:** HIST 5101, 5102, 5103 (usually taken in the last semester of coursework); 15 credits of additional coursework. Students may take up to six credits of graduate courses offered by other departments. In exceptional circumstances, students may petition the Graduate Advisory Committee for permission for additional studies outside the department. Up to six credits of independent studies HIST 5199 may be taken. In exceptional circumstances, students may petition the Graduate Advisory Committee for permission for additional independent studies. Up to six credits of 3000 level coursework, may also be taken with special permission. Doctoral students who have received a M.A. from the History Department at the University of Connecticut must complete a minimum of 12 credits of coursework.

**Foreign Language Requirement.** All students must satisfy the foreign language requirement prior to passing the general examination. The specific language(s) in which each student is to establish competency are to be

determined in consultation with the student's advisor. Two languages are required for students working in the areas of Medieval, Early Modern, and Modern European history. For all other fields, one language is required, with additional competency if required by the student's research area and faculty advisor.

**General Examinations.** The Ph.D. general examinations are intended to assess the development of doctoral students into professional historians who are familiar with the knowledge, literature, interpretations, and theories of their fields, and who demonstrate the substantive knowledge and analytic skills necessary for teaching at the college level and for conducting original research and scholarly analysis.

Three fields will be examined jointly in an oral examination. The fourth field consists of the dissertation prospectus. Students may not take the examination until all previous courses have been successfully completed, and all language requirements fulfilled. In recognition of the importance of students being in regular contact with their examiners while preparing for the examination, students should register for directed readings courses with committee members during the semester prior to the examination. Full-time students should complete the oral examination covering the first three fields no later than February 15<sup>th</sup> of the year following the completion of regular course work. (Part-time students should consult the Graduate Director concerning appropriate deadlines). If after the oral examination the student is judged by the committee to have failed in only one field, final judgment will be reserved, and the student must take an additional one-hour oral examination in that field by May 15<sup>th</sup> of the same academic year. If the student is judged to have failed the field a second time, or if the student fails more than one field initially, the student will not be continued in the program. If a student departing the program under these circumstances has not already earned the M.A., it may be conferred as a terminal degree.

The fourth field of the general examination is the dissertation prospectus. A completed prospectus should be submitted to the three core dissertation committee members within six months, and preferably sooner, of the successful completion of the oral examination. At the latest, the deadline for approval of the prospectus may be extended to August 15<sup>th</sup> of the year following the completion of regular coursework.

**Dissertation Research.** All doctoral students must enroll for at least 15 credits of GRAD 6950 (Dissertation Research) in the semesters after the general examination.

**Residence Requirement.** The doctoral student must complete a minimum of one year of full-time study in residence beyond the master's degree, which consists of two consecutive semesters of a full-time graduate program at the Storrs campus. A graduate assistant, whose academic program normally proceeds at half the rate of the full-time student, ordinarily fulfills this residence requirement with two years of such service. (This requirement does not mean the student must live on or near campus for their year of full-time study).

**Dissertation and Final Oral Examination.** A dissertation that makes a significant contribution to the candidate's field of specialization is a primary requirement for the doctorate. The final oral examination (dissertation defense) of approximately one to one-and-a-half hours focuses on the dissertation.

\*Doctoral students who enter the program holding a M.A. from another College or University are required to complete a minimum of 24 credits of coursework.

## Human Development and Family Studies (M.A., Ph.D.)

The Department of Human Development and Family Studies (HDFS) offers two graduate degrees: Master of Arts (M.A.) and Doctor of Philosophy (Ph.D.). The M.A. degree is a coursework-based degree (Plan B) or a research-based degree (Plan A) depending on student's goals. Master-level students who plan to pursue a Ph.D. should follow the research-based degree Plan of Study. The M.A. degree prepares students to work in non-profit organizations, foundations, state, local, or federal government, hospitals, and private corporations. The Ph.D. prepares students for research and teaching careers in human development, family studies, and related fields such as psychology, education, sociology, anthropology, and social work or in leadership positions with non-profit organizations, private foundations, and local, state, or federal government agencies. The M.A. and Ph.D.

degrees offer students the opportunity to focus on one of the following areas: Couple Relationships, Gerontology, Parenthood and Parent-Child Relationships, Health and Well Being, Prevention and Early Intervention.

### Master of Arts Requirements

Satisfactory completion of at least 30 credits maintaining a "B" average throughout the course of study.

**Master of Arts Required Courses:** HDFS 5001, 5003, 5215, 5310, 5005; EPSY 5605; one human development course HDFS 5101, 5102, or 5103; or one course in adulthood or aging HDFS 5240, 5242, or 5248. In addition, all M.A. students must organize a practicum experience in collaboration with a research project or service agency and their Major Advisor or an appropriate other faculty member; enroll in HDFS 5030 or 5088, and complete additional HDFS courses in their areas of specialization. Courses for areas of specialization can be fulfilled with HDFS courses or any related discipline area approved by the advisory committee. All students must pass a final oral examination for both Plan A and Plan B.

**Doctor of Philosophy Required Core Courses:** Students are required to satisfactorily complete 19 total credits of HDFS 5001, 5215, 5310, 5311, 5340; one course in child or adolescent development HDFS 5101, 5102, or 5103; one course in adulthood or aging HDFS 5240, 5242, or 5248.

**Methodology Courses:** 12-15 credits selected from HDFS 5003, 5004, 5005; EPSY 5605, 5607, or appropriate advanced research courses with focus on quantitative or qualitative methods (with approval of advisory committee).

**Area of Specialization or Thematic Courses:** 21-24 credits can be fulfilled with HDFS courses or any related discipline area approved by advisory committee. This requirement can include practicum Experiences and/or Apprenticeships listed below; and 15 Graduate Dissertation credits (GRAD 6950).

**Practicum Experiences/Apprenticeships:** Credits determined by advisory committee; approximately three to six credits. This requirement includes some combination of teaching, applied research/policy, service/outreach, and basic research apprenticeships as appropriate for the student's plan of study HDFS 5000, 5010, 5030, 5088.

**Comprehensive Examination.** Ph.D. Students are required to complete a Comprehensive Examination, which consists of a comprehensive, critical review of the literature in a substantive area of the student's scholarly area of interest.

The Ph.D. does not have a related area or foreign language requirement.

## Judaic Studies (M.A.)

The Judaic Studies graduate program provides a unique opportunity for students with specialized interests in Jewish literature, culture, and history to pursue their research in the context of other relevant literatures, cultures and languages, all of which are integrated within the Department of Literatures, Cultures, and Languages (LCL), which incorporates, aside from Hebrew and Judaic Studies (HEJS), sections devoted to Arabic Studies, Classics and Ancient Mediterranean Studies, Chinese, Comparative Literary and Cultural Studies, French and Francophone Studies, German Studies, Italian Literary and Cultural Studies, and Spanish Studies. Students may also take relevant courses in other programs and departments beyond LCL, especially Medieval Studies, which has a particularly strong relationship with LCL and Judaic Studies.

Areas of special emphasis include: Biblical Studies, including the translation, exegesis, and comparative study of the Hebrew Bible from the ancient to the modern period; relations between Jews and Non-Jews, including their relations in the Hellenistic and Roman Worlds, Jewish-Christian relations (from ancient to modern times), and the Jews, Christians, and Muslims from medieval times to the early modern period; and varieties of Jewish identities and expression, including the self-perception and presentation of the Jews in their literatures as well as their representation and the mediation of Jewish themes in the writings of non-Jews.

A terminal Master of Arts in Judaic Studies may be pursued. Students who wish to pursue the Doctorate of Arts degree do so through the Department of Literatures, Cultures, and Languages by combining their interest in a relevant culture and literature (e.g., German, Spanish, Italian, French, Arabic) with a concentration in Hebrew and Judaic Studies.

The UConn Center for Judaic Studies and Contemporary Jewish Life offers support for graduate studies in the form of teaching and research assistantships. Students enrolled in the M.A. program in Judaic Studies are eligible for these assistantships, which cover tuition and fees and include a stipend for living expenses. Students who apply for admission to the M.A. program will automatically be considered for funding.

#### Master of Arts Requirements

Requires a minimum of 30 credits of graduate coursework. Work leading to the degree of Master of Arts in Judaic Studies may be undertaken either with Plan A (21 credits, a thesis, and a final oral examination) or Plan B (30 credits, and a final written examination, without thesis). Plan A requires not fewer than 21 credits of advanced coursework and not fewer than nine additional credits of Master's Thesis Research (GRAD 5950 or 5960). In either case, course work in Judaic Studies is to be distributed among several sections in LCL, Medieval Studies, and, on occasion, other departments. (The student's advisory committee, which is responsible for designing the plan of study in consultation with the student, is composed of representatives of these constituencies.) In addition, students following either plan must take CLCS 5302 and LCL 5030, which are departmental requirements. The advisory committee may require more than the minimum number of credits, especially since a minimum of two years of college-level Hebrew language instruction (or its equivalent) is required in order to receive the Master's degree. Specific characteristics of the thesis or the examination will also be determined by the advisory committee. M.A. students planning to apply to the Ph.D. program should complete during the first year of the M.A. program the three-credit course in Literary Theory (CLCS 5302) and the three-credit course on Methods and Approaches to Second Language Acquisition (LCL 5030).

### Linguistics (M.A., Ph.D.)

The Department of Linguistics offers the graduate degree of Doctor of Philosophy (Ph.D.). The Ph.D. program in linguistics involves coursework and independent research in a wide variety of areas of generative linguistics, including theoretical and experimental approaches. The aim of the program is to prepare students for all aspects of an internationally successful academic career. The Ph.D. program is strongly oriented towards academic careers, but may also provide an excellent background for non-academic, language-related careers. Although the Department of Linguistics only admits graduate students into the Ph.D. program, a Master of Arts degree can be awarded to students in the Ph.D. program when the requirements have been met (see M.A. requirements below).

#### Doctor of Philosophy Requirements

The Ph.D. program in Linguistics conforms to the Graduate School requirements as outlined in the Academic Regulations section of this catalog. Specific course requirements for the Ph.D. in Linguistics are determined by the student's advisory committee consistent with the minimum requirements specified by the Graduate School. The program is designed to be completed in five years. Due to course sequencing, students are normally only admitted for the Fall semester. The specific requirements for obtaining a Ph.D. in Linguistics are listed below.

**Required Courses.** Students must complete a total of 40 credits in accordance with a plan of study approved by their advisory committee.

**General Examination.** Students satisfy the general examination requirement by completing two research papers of publishable quality, each building on a proposal that has been approved by the faculty of the Department of Linguistics. The student is examined on the content of each completed paper.

**Dissertation Proposal.** Students must submit a dissertation proposal in accordance with the rules specified in the Graduate Catalog.

**Doctoral Dissertation.** Students must complete a doctoral dissertation and defend it in the course of a public oral examination.

#### Master of Arts Requirements

An M.A. degree can be awarded after the completion of 30 credits of coursework on an approved plan of study in connection with the Thesis or Non-Thesis plan as outlined in the Academic Regulations section of this catalog.

### Literatures, Cultures, and Languages (M.A., Ph.D.)

The Department of Literatures, Cultures, and Languages offers two programs at the graduate level. The Master of Arts (M.A.) and Doctor of Philosophy (Ph.D.) programs. Both the M.A. and the Ph.D. programs offer seven areas of concentration: Applied Linguistics and Discourse Studies, Comparative Literary and Cultural Studies, French and Francophone Studies, German Studies, Hebrew and Judaic Studies, Italian Literary and Cultural Studies, and Spanish Studies. The M.A. program prepares students for doctoral work in Literatures, Cultures, and Languages, and equips them to teach a range of languages and cultures in private and public schools. The Ph.D. program prepares students for college-level teaching and academic work in a number of fields within Literatures, Cultures, and Languages, as well as for a wide array of professional careers beyond the traditional academic pathway.

#### Master of Arts Requirements

Students must complete CLCS 5302 and LCL 5030, and earn a minimum of 30 credits above the B.A. Additionally, students should pass an M.A. examination or write a Master's thesis depending on the requirements of each specific area of concentration and whether the student is applying to continue in the Ph.D. program or receiving the M.A. as a terminal degree.

#### Doctor of Philosophy

First-year students in the Ph.D. program will have an assigned temporary advisor in their specific area of concentration. A definitive major advisor according to the student's area of specialization has to be chosen by the end of the first year in the Ph.D. program. The major advisor and the student will choose two associate members for the dissertation committee. Every plan of study is individually structured by a committee chosen by the student in consultation with their main advisor.

**Doctor of Philosophy Requirements.** At least 24 credits in coursework and a minimum of 12 credits in the chosen area of concentration; second language teaching methods course (not necessary if taken at the M.A. level); literary theory course (not necessary if taken at the M.A. level); research methodologies and professionalization course LCL 6030; successful completion of the Ph.D. comprehensive examinations; successful completion and approval of a dissertation prospectus; successful defense of a dissertation; and competence in reading scholarly material in one language besides English and the language connected to the area of concentration.

Students who are accepted in the Ph.D. program with an M.A. from another university will need advisory committee approval of satisfaction of equivalents for Literary Theory (CLCS 5302) and Methods and Approaches to Second Language Acquisition (LCL 5030). If Ph.D. students with external M.A. degrees receive a grade of "B+" or lower during their first semester, they are required to take a Qualifying Examination (QE), which will be administered by a committee chosen by the Ph.D. and M.A. advisors during the second semester. The QE will test aptitude for literary and cultural criticism and general knowledge in the chosen field of concentration. Students who do not pass the QE on their first attempt will not be allowed to continue in the program beyond the first year.

### Materials Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science offers programs leading to Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in the area of Material Science. All programs include training in synthesis, characterization, and applications of materials, and give students sufficient flexibility to pursue their special interests as well as time to take courses in other departments at the University of Connecticut.

#### Master of Science in Materials Science

The program normally requires 31 credits. While it is possible to complete the M.S. degree within a year, most students will need three to four semesters. The courses of the program cover courses concerning synthesis, characterization, and applications of materials. The plan of study for the M.S. degree may be formulated with related work in almost any area, e.g., Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and

Engineering. Students are encouraged to participate in research projects done by members of the department.

**Requirements:** There are no specific required courses. All students must choose a committee for the M.S. degree and that committee must approve all courses. Typical courses are any of the 5000 series courses in Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. The final requirement is passing the Master's Exam which has two parts. One is a written test concerning basic understanding of course materials. The second requirement is a final oral exam which includes course work, and any research done by the student. For a course work master's degree there is no thesis requirement. For a research based Master's degree, there is a requirement of a Master's thesis. All students are encouraged to follow the research degree route.

In order to be considered for a possible switch to the Ph.D. program or for financial support, a student with an M.S. degree in Materials Science or someone showing great promise during the M.S. program needs to apply to the Ph.D. Program.

### Ph.D. Program

Emphasizes development of the ability to generate novel research results in Materials Science. Individuals with a Bachelor's degree in any major, with an interest in Materials Science are encouraged to apply. The course work typically consists of at least 16 graduate level courses that cover a wide range of topics, including Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. After completing the necessary course work and a sequence of examinations, a Ph.D. candidate must complete a dissertation that makes an original contribution to the field of Materials Science.

**Requirements:** For students entering the program after a Bachelor's Degree, typically 16 to 18 courses are required. An individual plan of study is developed by the student and their Advisory Committee. Courses in the following departments are considered: Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering.

In general, Ph.D. students must take graduate level courses that are approved by the major advisor of a student, as well as the student's advisory committee. The materials science program has no requirement on foreign languages.

The first formal requirement for the Ph.D. degree is passing the General Examination. The general examination consists of a written exam which is an original proposal. If the student passes the written exam, they are then asked to prepare for an oral examination. The oral exam consists of any aspect of course work, the written exam questions, and the proposal, research progress, or combinations of these. The preparation of a dissertation then follows, where the student must present an original contribution to the general area of Material Science. The final requirement is a defense of the Ph.D. dissertation before the Ph.D. Advisory Committee, students and anyone else interested in attending. The exam consists of a presentation by the student, questions of the students and audience, and then a closed session of questions from the Advisory Committee.

## Mathematics (M.S., Ph.D.)

The Department of Mathematics offers two degrees in Mathematics, Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). The M.S. degree can be pursued with a concentration in Actuarial Science. The M.S. degree provides general training in mathematics suitable as preparation for a Ph.D. program or for a career in education or industry. The M.S. degree with concentration in Actuarial Science is more narrowly focused to prepare students for careers as practicing actuaries in the insurance, pension, financial or consulting industries. The specific requirements, in addition to the Graduate School requirements, for each degree and concentration are listed below.

### Master of Science

Non-thesis students must either pass two written preliminary examinations at the level of a master's from a list of examination topics approved by the

department, or pass an oral examination. Thesis M.S. students may choose the thesis option and write a master's thesis under the direction of a member of the Graduate Faculty in Mathematics.

**Master of Science with concentration in Actuarial Science.** Students must pass at least five core courses from among MATH 5620, 5630, 5631, 5637, 5638, 5639, 5640, 5641, 5650, 5660 and 5661. The remaining coursework must come from a list of elective courses approved by the department. In addition, the student must either pass two written preliminary examinations at the level of a master's from a list of examination topics approved by the department or pass two actuarial examinations given by the Society of Actuaries or the Casualty Actuarial Society. The actuarial examinations may be passed prior to admission.

### Doctor of Philosophy

In addition to the Graduate School requirements (including the foreign language or related area requirement), the Ph.D. requires that the student pass three preliminary examinations at the Ph.D. level from a list of examination topics approved by the department. A student typically takes the associated preliminary course before the examination, but this is not required. In addition, the student must pass two core courses with a grade of "B" or better. The chosen core courses must be different from the graduate courses associated with the three preliminary examinations passed by the student. The list of core courses depends on the student's research focus: for a pure math focus, MATH 5111, 5120, 5160, 5210, 5211, 5260, 5310 and 5360; for an applied math focus MATH 5111, 5120, 5160, 5310, 5410, 5440, 5510 and 5520; for an actuarial science focus, MATH 5111, 5120, 5161, 5210, 5211, 5310, 5360, 5410, 5440, 5510 and 5520.

## Medieval Studies (M.A., Ph.D.)

The Medieval Studies Program offers two graduate degrees: Master of Arts degree (M.A.), and Doctor of Philosophy (Ph.D.). The M.A. program provides preparatory training for a Ph.D. in a medieval field. Generally our M.A. students intend afterward to pursue a Ph.D. in Medieval Studies or in History, English, Romance Languages, or another field.

### Master of Arts in Medieval Studies

The M.A. degree should be completed within two years, though the Graduate School sets a six-year maximum on completion from the date of initial matriculation. M.A. students are required to complete 31 credits, usually in this pattern: seven credits in the first semester taking ENGL 5100 and 5182; and a three credit graduate course of their choice; nine credits in the second semester; six credits in the third semester; and nine credits in the fourth semester.

**Required Courses:** ENGL 5100, 5182, 5315, 6315; HIST 5316; and six additional three credit courses.

Four courses should form a major concentration in one field, and three courses should form a minor concentration in another field; these courses may overlap with the core distribution requirements.

Students must also pass the M.A. written examination, which may be taken any time after the first two semesters of coursework and before April of the second year of study: the timing is decided on an individual basis. Students should create a major and minor field reading list in consultation with the advisor, and answer one question about each list within a four hour examination period. Students must also demonstrate competence in Latin (either through coursework or a written examination).

### Doctor of Philosophy in Medieval Studies

Requirements for the Doctoral degree should ordinarily be completed in five years for Ph.D. students, but work for the Ph.D. degree must be completed within eight years of the beginning of the student's matriculation. Ph.D. students are ordinarily required to complete 25 credits of coursework at UConn for the Ph.D., and at least 40 credits total of graduate work.

**Required Courses:** ENGL 5100, 5182, 5315, 6315; HIST 5316; four additional three credit courses. Four courses should form a major concentration in one field, and a minimum of two courses each should form two minor concentrations in two other fields. Students must demonstrate competence in Latin and in two modern languages, either through coursework or by examination. Students must also complete four preliminary examinations (4 hours each) followed by an oral examination, a dissertation prospectus, and a dissertation and defense.

Students who feel they have fulfilled any of the requirements listed above at another institution may petition the graduate program office to have those requirements waived at UConn. Students who previously took the M.A. in Medieval Studies at UConn will not be required to take ENGL 5100 and 5182 again.

## Molecular and Cell Biology (M.S., Ph.D.)

The Department of Molecular and Cell Biology offers Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Molecular and Cell Biology. Modern molecular and cell biology is an interdisciplinary field that overarches classic research disciplines. Upon admission to the Molecular and Cell Biology Field of Study, students pursuing a Ph.D. or M.S. degree focus on one of four Areas of Concentration: Cell and Developmental Biology; Genetics and Genomics; Microbiology; and Structural Biology, Biochemistry and Biophysics. The M.S. in each of the Areas of Concentration may be either a coursework or research-based degree. Students enrolled in the program will develop competencies in critical thinking, hypothesis design and testing, and technical expertise required to conduct research as an independent scientist in molecular and cell biology. In addition to formal courses and laboratory research, training includes the development of skills in scientific writing and communication, and mentoring others in scholarly and research activities.

**Requirements:** The M.S. and the Ph.D. requirements in Molecular and Cell Biology conform to the Graduate School requirements as outlined in the Academic Regulations section of this catalog. Specific course requirements for the M.S. and PhD in Molecular and Cell Biology are determined by the student's advisory committee consistent with the minimum requirements specified by the Graduate School. Ph.D. students are required to take section 01 of MCB 5899; section 02 of MCB 5899; and MCB 6000, unless they were enrolled in an MCB Master's program prior to entering the Ph.D. program. In special circumstances the advisory committee may waive some of these requirements. The Ph.D. in Molecular and Cell Biology does not have a related area or foreign language requirement, unless one is specified by the advisory committee.

## Oceanography (M.S., Ph.D.)

The Department of Marine Sciences offers graduate studies in the field of oceanography, leading to the degrees of Doctor of Philosophy and Masters of Science. Since the M.S. program is research oriented, most Masters students are in the Plan A program. Entry into the Ph.D. program usually requires a Master's degree, but particularly well-prepared students may enter directly from a Bachelor of Science program.

### Master of Science Plan A

Requires 21 credits of advanced coursework, nine GRAD 5950 credits, and completion of a research project, the results of which are reported in a thesis.

### Masters of Science Plan B

Requires 30 credits of advanced coursework and a final examination. No research project is required.

**Course Requirements.** The academic program is developed around a two-tiered structure: four courses MARN 5010, 5030, 5050, and MARN 5065, designed to provide a core understanding of the basic sub-disciplines of the field of oceanography, followed by a series of more specialized courses offered to meet the individual needs of the student.

### Doctor of Philosophy

Requires 30 course credits plus 15 credits of GRAD 6950 in addition to six related area credits. Doctoral students who have already earned a Master's in the field of study or closely related field must earn 15 credits beyond the Master's plus 15 credits of GRAD 6950 in addition to six related area credits.

## Philosophy (M.A., Ph.D.)

The graduate program in Philosophy at the University of Connecticut enables students to earn a Master of Arts (M.A.) in the process of obtaining the Doctor of Philosophy (Ph.D.). We generally admit only those students intending to obtain the Ph.D. Most students enter with at least a B.A. in Philosophy or related field (such as Cognitive Science, Linguistics, or Neuroscience) and obtain the M.A. in the first two years of the program,

proceeding from that point to the Ph.D. Students who are admitted with an M.A. in Philosophy from another program have the option of accelerating their progress toward the Ph.D. In addition to those imposed by the Graduate School, the graduate program in Philosophy has additional requirements listed below.

### Master of Arts in Philosophy

Requires a minimum of 33 credits from Philosophy coursework, plus an additional three credits of Master's Thesis Research.

**Required Courses:** PHIL 5301 and 5307.

**Philosophical Writing.** Students must submit two essays from any area(s) of Philosophy demonstrating mastery of one or more subject matter in the field.

**Research Proposal.** Students must demonstrate ability to formulate an original and defensible line of philosophical research.

### Doctor of Philosophy

The Ph.D. requires a minimum of 24 credits beyond the M.A. degree, plus 15 credits of GRAD 6950 (Dissertation Research).

**Required Courses:** PHIL 5301 and 5307.

**General Examination.** Students must demonstrate mastery in each of three areas: Ethics, Social and Political Philosophy; Metaphysics, Epistemology, Language, Formal Semantics, Mind, Science, Logic, and History of Philosophy.

**Dissertation Proposal.** Students must complete a dissertation proposal, which includes submitting a written proposal and passing a formal dissertation proposal evaluation.

**Dissertation.** The dissertation has both a written and oral component.

## Physics (M.S., Ph.D.)

The Department of Physics offers two graduate degrees: Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). The M.S. degree is aimed at students pursuing careers in industry, state or federal government or science/physics education. The M.S. in Physics may be either a completely coursework based degree or it may have a thesis component as described later. The Ph.D. in Physics prepares students for research and teaching careers in physics and engineering disciplines, including research and leadership positions with non-profit organizations, industry, universities, private foundations, and state or federal government agencies.

### Master of Science in Physics

Students follow an individual plan of study arranged jointly by the student and an advisory committee, based on the student's career goals as well as prior preparation. Candidates for the master's degree without thesis are required to complete 30 credits of courses. Candidates for the master's degree with thesis are required to complete 21 credits of courses and nine credits of thesis research, as stipulated in the Academic Regulations of this catalog.

**Master of Science without Thesis Course Requirements:** PHYS 5101, 5201, 5301, 5401, 5402, and 5500 totaling 18 credits. The remaining 12 credits could be 5000 or higher level courses from Physics, Mathematics, Biology, Chemistry, or School of Engineering.

**Master of Science with Thesis Research Course Requirements:** PHYS 5101, 5201, 5301, 5401, 5402, 5500 totaling 18 credits, and nine credits of thesis research GRAD 5950. The remaining three credits could be 5000 or higher level courses from Physics, Mathematics, Biology, Chemistry or School of Engineering.

### Doctor of Philosophy in Physics Course Requirements

PHYS 5302 and 5403. The rest of the credits necessary for a Ph.D. (on the Plan of Study) are determined by the student's advisory committee. These credits could be 5000 or higher level courses from Physics, Mathematics, Biology, Chemistry or School of Engineering.

**General Examination.** Ph.D. students are required to pass a General Examination (often referred to as the "preliminary examination"), which consists of four written examinations on core physics subjects. Details are on Physics Department website.

**Dissertation Proposal.** By the end of their third year, all Ph.D. students must have an Advisory Committee and must complete their Dissertation Proposal (details and form at the Graduate School website). The written proposal must be approved by the student's Advisory Committee, including an oral defense of the proposal before a committee composed of their Advisory Committee and two other faculty examiners.

**Additional General Requirements.** In addition, the following requirements apply to all students entering the Physics graduate program. Each year, each student must complete, in consultation with their faculty advisor, a Physics Graduate Student Progress Form. A Plan of Study must be completed by M.S. students no later than the beginning of the final semester, and for Ph.D. students no later than when 18 credits of course-work have been completed. All Physics graduate students are expected to attend the Departmental Colloquium, and to participate in the regular research seminars in the department. A Safety Examination is required of all graduate students; a Shop Course is required for use of the Physics Machine Shop, and Laser Safety Training for students using lasers. All beginning graduate students are required to attend the Computer Information Workshop and Orientation on Computer Use and Security. There is no foreign language requirement for the Physics M.S. and Ph.D. degrees.

### Physiology and Neurobiology (M.S., Ph.D.)

The Department of Physiology and Neurobiology (PNB) offers Doctor of Philosophy (Ph.D.) as well as Plan A (Thesis) or Plan B (Coursework) M.S. degrees in Physiology and Neurobiology. Possible areas of focus include molecular, cellular, and systems level neurobiology, endocrinology, reproductive physiology, or liver biology. The PNB graduate program offers opportunity for intellectual growth through learning and discovery, development of technical and problem-solving skills, critical thinking, and effective scientific communication.

**Requirements.** The Ph.D. and M.S. degree requirements in Physiology and Neurobiology conform to the Graduate School requirements. Ph.D. and M.S. degrees in PNB require completion of a set of four core graduate courses from the PNB department, chosen from a list of approved courses (see below). Ph.D. students will generally complete an additional two to four advanced courses from inside or outside of PNB chosen in consultation with the student's advisory committee. The Ph.D. in PNB does not have a related area or foreign language requirement. Research activities for Ph.D. students are primarily credited as PNB 5397 but must also include 15 credits of GRAD 6950. M.S. students will complete a minimum of 30 credits, including nine credits of GRAD 5950 for the Plan A M.S. All graduate students are required to register for PNB 6405 and 5396 each semester.

**M.S. and Ph.D. Required Core Courses:** at least one three-credit neurobiology course; at least one three-credit physiology course; and two additional three-credit PNB graduate level courses chosen in consultation with the student's advisory committee. Students are expected to pass all four core courses with a grade of "B-" or better. Course offerings that fulfill the core course requirements with an emphasis in Neurobiology include PNB 6417, 6418, 6426, and 5700. Core courses that fulfill an emphasis in Physiology include PNB 5302, 5270, and 5390. No more than two of PNB 5700, 5270, or 5390 can be used to fulfill the core course requirements.

### Political Science (M.A., Ph.D.)

The Department of Political Science offers a graduate program leading to the Doctor of Philosophy (Ph.D.) and the 5th Year Master of Arts (M.A.). Only UConn undergraduates are eligible to enter the Master's program. The graduate curriculum is designed to serve the individual needs of students as they prepare for the variety of opportunities that the field offers for teaching, research and administrative positions in the public and private sectors. Emphasis is placed on developing an understanding of the dynamics and institutions of political life and learning the methods necessary for empirical and qualitative research and analysis. The Ph.D. program is designed to be completed in five years, with the first four-five semesters focused on coursework, the third year devoted to preparing for and passing qualifying examinations and preparing the dissertation prospectus, and the final one-two years on research and completion of the dissertation. In addition to the Graduate School requirements, the graduate programs in Political Science have the following requirements.

### 5th Year Master of Arts

To complete the 5th Year Master's Program, students must earn an average of "B" or above in their 30 hours of coursework. Six of these course credits are earned during the student's final undergraduate year. These six credits cannot be counted toward their B.A. degree.

**Required Courses:** All 5th year students must take the three required courses in our Ph.D. Methods Sequence: POLS 5600, 5605, and 5615. In addition, students are required to take at least two courses in one of the five POLS subfields (American Politics, Comparative Politics, International Relations, Political Theory, and Public Law). If a student is focusing on one of the three subfields in which a professional seminar is offered (POLS 5200, 5300, and 5100), the student is strongly recommended to take it. In addition, all students must take POLS 5010 and 5000 for three credits each. The latter need not be done with the student's major advisor. Finally, in addition to these seven courses, students must take one other course of their choosing that is approved by their major advisor.

**Research Presentation:** All 5th Year Master's students must present the research conducted in POLS 5000: Independent Study in Political Science at the 5th Year Student Spring Research Conference at the end of the student's fifth year.

### Doctor of Philosophy

All students are required to take and pass examinations in two of the five subfields (American Politics, Comparative Politics, International Relations, Political Theory, and Public Law). The course requirements are listed below.

**American Politics:** POLS 5406, 5407, 5408, and 5409.

**Comparative Politics:** POLS 5200; and at least four additional graduate-level courses in Comparative Politics.

**International Relations:** POLS 5300; and four other graduate-level International Relations courses.

**Political Theory:** POLS 5100; and at least four graduate courses in political theory.

**Public Law:** POLS 5505, 5510, and 5515; and either POLS 5010 or 5010.

**Additional Doctor of Philosophy Requirements.** In addition, all Ph.D. students must successfully complete POLS 5600, 5605, 5615; and one advanced methods elective approved by their major advisor. Finally, all POLS Ph.D. students must enroll in GRAD 6950-003 in their first, second, third, and fourth semesters. Students must earn an average grade of "B" in their coursework.

**Qualifying Examinations.** Students must take and pass examinations in two subfields, one of which is also their dissertation subfield.

**Dissertation Prospectus.** The prospectus will be developed in conjunction with and approved by the student's dissertation committee, which must include at least three members of the Political Science graduate faculty. Students must defend their prospectus orally to their dissertation committee. The Graduate School requires that a total of five people must approve the prospectus document, signing off on its acceptability. These five people should be a combination of committee members and/or external reviewers. Students are expected to defend the prospectus within six months of passing their Ph.D. examinations. Students who fail to do this will be notified by the Director Graduate Studies, alerting them that they are in violation of this policy while the Department Head will notify their major advisor. Reason(s) for the student's non-adherence to the timeline will be identified for the purpose of legitimizing the delay and/or devising and implementing measures to expedite progress. Two-month extensions may be granted in the event that reasonable progress is being made towards completion of the prospectus. If a student does not complete the prospectus in a timely manner, their standing in the program will have to be considered, which may entail losing their funding in the department's graduate program.

**Dissertation.** When the major advisor and student agree that the dissertation is complete, the major advisor will organize a public defense. The full dissertation committee and any external readers must be present.

## Polymer Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science Polymer Program serves as the sole center in the State of Connecticut for graduate research and education programs focusing on polymer science and engineering. The program is a nationally and internationally recognized center of excellence for interdisciplinary research and education in the fields of polymer science and engineering. The program is dedicated to meeting the educational needs of its graduate and professional students; providing lifelong learning opportunities in the study of polymeric materials; to assisting Connecticut industry in developing polymer technology; and to expanding and disseminating the global knowledge base regarding polymeric materials.

### Master of Science Program

Other than the GRE General Test scores, there are no special requirements for admission to the master's program beyond those of the Graduate School. Selection of Plan A (thesis) or Plan B (non-thesis) is made after consultation with the Advisory Committee. For Plan A, the student must successfully complete no fewer than 21 credit hours and no fewer than nine additional credits of Master's Thesis Research by taking GRAD 5950 or 5960, as well as the writing an oral defense of a thesis. For Plan B, the student must successfully complete no fewer than 30 credits of advanced course work and a comprehensive final examination, but no thesis is required.

### Doctor of Philosophy Program

Admission to the doctoral program is based upon a careful assessment of the student's potential for creative research in polymer science. There are no special requirements for the doctoral program beyond those of the Graduate School, other than the GRE General Test scores.

**Requirements:** No fewer than 30 credit hours of advanced coursework, including POLY 5352, 5380, 5381, 5382, 5384, 6001; GRAD 6950 for at least 15 additional credits. The General Exam, which consists of two parts: a written portion and an oral portion. The written portion is a comprehensive cumulative four-part exam. The oral portion is the writing and oral defense of a dissertation proposal. The Doctoral Dissertation, which consists of two parts: a written dissertation, and an oral defense of the dissertation before a committee of faculty and the general public.

## Psychological Sciences (M.S., Ph.D.)

The Department of Psychological Sciences offers two graduate degrees: a Master of Science (M.S.) and a Doctor of Philosophy (Ph.D.).

### Master of Science

Students enrolled in all Ph.D. program concentrations except Ecological Psychology are expected to complete a Master's degree as part of the Ph.D. program. (Students who enter the Ph.D. program with a Master's might be eligible for a waiver of the Master's requirement by the Division Head of the relevant Concentration.) The Master's program requires a minimum of 30 course credits. Ordinarily, the Master's degree should be completed within three years; all work for the Master's degree must be completed within six years.

**Master of Science Requirements.** The Graduate School offers two types of master's programs: Plan A (Thesis) and Plan B (Non-Thesis). Ph.D. students in the Psychological Sciences Department are typically expected to complete a Plan A (Thesis) master's as part of the Ph.D. program. In some situations students may be allowed to complete a Plan B master's if they will not continue in the Ph.D. program. This decision is up to the discretion of the Major Advisor and Division Head. A description and requirements of each Plan are indicated below.

**Plan A (Thesis).** This plan emphasizes research activities and requires a minimum of 30 course credits which must include: PSYC 5104 (minimum of "B-" required for students completing the Ph.D.); GRAD 5950 or 5960 for a minimum of nine credits. Plan A Master of Science students must complete a Master's thesis, following the rules specified by the Graduate School.

**Plan A Final Examination.** Near the close of the candidate's period of study, not later than one year after the completion of coursework,

the student must pass a final examination under the jurisdiction of the advisory committee. This will be an oral examination (defense) based on the candidate's thesis and issues relevant to the thesis.

**Plan B (Non-Thesis).** This plan emphasizes comprehensive understanding of a more general character than the thesis plan and requires a minimum 30 credits of advanced coursework, which must include: PSYC 5104 (minimum of "B-" required for students completing the Ph.D.); PSYC 5800 for a minimum of three credits. The research project must be approved by the student's Advisory Committee.

**Plan B Final Examination.** Near the close of the candidate's period of study – not later than one year after the completion of coursework – the student must pass a final examination under the jurisdiction of the Advisory Committee. The examination is arranged by the Major Advisor with the assistance of the Associate Advisors.

### Doctor of Philosophy Program Divisions

The Psychological Sciences Department has six Divisions with Ph.D. Programs are offered in the following areas of concentration: Behavioral Neuroscience (Behavioral Neuroscience Division); Clinical Psychology (Clinical Division); Developmental Psychology (Developmental Division); Ecological Psychology (Perception, Action, Cognition Division); Industrial and Organizational Psychology (Industrial and Organizational Division); Language and Cognition (Perception, Action, Cognition Division); Neurosciences (Behavioral Neuroscience Division); Social Psychology (Social Division).

**General Requirements for Ph.D. Plan of Study.** For all divisions, the Department requires 15 credits of Doctoral Dissertation Research (GRAD 6950 or 6960); plus 15 credits of Ph.D. content coursework, which must include nine credits of breadth courses and course requirements that vary with the student's chosen area of concentration and division (see details below). In addition to those requirements, all Ph.D. students must complete two statistical courses: PSYC 5104 and 5105.

**Ph.D. Plan of Study Psychological Sciences Department Requirements.** Pre-dissertation Research: at least one completed research project. This requirement can be met by a Master's thesis or by a minimum of six credits of PSYC 5800 when appropriate.

**Department Breadth Requirements.** In order to expand the student's knowledge beyond their specific area of study, a minimum of nine credits (typically three courses) of graduate work outside the student's Division required. Usually any graduate class outside the student's Division or the department will count as breadth, assuming it meets the following guidelines: PSYC 5104 and 5105 may not be used to fulfill the breadth requirement; no more than two quantitative courses, defined as courses that count for the Graduate Certificate Program in Quantitative Research Methods, may be used for breadth. No more than one breadth course may be taken with any one instructor, aside from the following classes: a course in grant writing; PSYC 5100, 5140, 5285; COGS 5001; three credit hours of PSYC 5801, taken with a faculty member outside the student's Division, will meet Department breadth requirements as one course. (However, the Head of that faculty member's Division must consent to this.) Students in the Perception, Action, Cognition Division who are in the Language and Cognition Concentration may use courses given by the Ecological Psychology faculty as breadth courses. Students in the Ecological Psychology program may, likewise, take courses offered by the Language and Cognition faculty to fulfill the breadth requirement. Upper level undergraduate classes in other departments and other courses may be considered for breadth on a case-by-case basis. Courses in other departments that are cross-listed as PSYC courses will not count towards the departmental breadth requirement if the PSYC version of the course is in the student's Division, even if the student registers for the course under the external department course number. (BME 6086, cross-listed as PSYC 5270 will not count for BNS students). Students entering the program with a master's from a different (Psychology or non-Psychology) department or division may have up to 6 breadth credits waived (up to two classes). A grade of at least "C+" must be earned in all courses elected for the purpose of meeting the departmental breadth requirement. If, in undertaking to meet the breadth requirement, a student fails to earn a grade of at least "C+" in any one course, but earns an overall average grade greater than "C+", that student may submit a request to the Associate Department Head/Coordinator of Graduate Studies for a review of his or her case. The breadth requirement should ordinarily be completed in or before the semester in which the student takes the General Examination.

**Quantitative Methods Requirements.** All graduate students are required to take (or be exempted from) PSYC 5104 and 5105. Each student must earn a grade of at least “B-” in both courses to meet Department requirements for the Ph.D. Any student with no previous statistics experience or who has a need to review undergraduate statistics should take STAT 1100Q on an audit basis before taking PSYC 5104. Note that the six required credits of Quantitative Methods should be listed on the Ph.D. Plan of Study in the “Related Area” section and do not count towards the breadth requirement or minimum number of required Ph.D. credits and should not be listed in the Ph.D. Plan of Study “Coursework” section on page 2. Students who have taken statistics coursework prior to their enrollment in the Ph.D. program, may be eligible for a waiver of one or both of the Quantitative Methods courses.

**Licensure Requirement.** Students interested in licensure should contact their program for details on American Psychological Association recommendations and relevant courses offered by the department.

**General Examination.** Students must pass a General Examination. Details may vary across divisions.

**Dissertation Proposal.** Before dissertation research is undertaken, a research proposal must be approved.

**Dissertation and Final Ph.D. Oral Defense.** Students must pass an oral defense and submit an approved thesis.

**Degree Milestones.** In addition to these general requirements, students within a given Division must satisfy the following division-level requirements. Master’s Thesis and Defense (not required for Ecological Psychology Concentration): Ph.D. Qualifying Examination; Ph.D. Prospectus; Ph.D. Dissertation Document and Defense.

**Behavioral Neuroscience Concentration Required Courses.** PSYC 5104, 5105; four semesters of Behavioral Neuroscience (BNS) seminars; two graduate-level BNS courses from two different areas of expertise, taught by different BNS psychology professors; at least six credits of graduate research; for the Ph.D., students must obtain at least 24 total credits in addition to any credits going towards the master’s degree.

**Behavioral Neuroscience Concentration, Master’s Only Option Required Courses.** At least 30 total credits including no more than six at the undergraduate level; PSYC 5104; two to four semesters of Behavioral Neuroscience (BNS) Seminar, for terminal master’s students two semesters are required, but it is recommended that the student enroll each semester in the program up to the fourth semester. For Ph.D. students who are initially obtaining a master’s, four semesters are required; two BNS courses with at least one graduate content course from each of two different areas of expertise (i.e., taught by different BNS psychology professors; at least six credits of graduate research.

**“Plan A” Additional Requirements.** A master’s thesis, with oral defense and a committee of three faculty members. At least three to four semesters in the program are recommended.

**“Plan B” Additional Requirements.** A written master’s examination is required, consisting of either: three questions from different faculty members (at least two in Behavioral Neuroscience), which each serve as the basis for a 10-15 page paper to be completed in 7-10 days; or a research report or literature review, which is reviewed by the master’s committee.

**Clinical Psychology Concentration 1st Year Required Courses:** GRAD 5950; PSYC 5104, 5105, 5300, 5301, 5302, 5303, 5304, 5305, 5307, 5399; PSYC 6301 and 6302 the Practicum in Adult/Child Psychotherapy (observation only).

**Clinical Psychology Concentration 2nd Year+ Required Courses:** GRAD 5950, and 6950 (once master’s is completed); PSYC 5300, 5332, 5306, 5140, 5399, 6301, 6302; an additional three related classes, totaling nine credits.

**Clinical Competence.** To receive the Ph.D. in Clinical Psychology, students must demonstrate clinical competence in training experiences in our training clinic and in off-site clinical placements, as well as a full-year internship.

**Developmental Psychology Concentration Required Courses:** five of these seven courses by degree’s end\*\*: PSYC 5410\*, 5420, 5425, 5440, 5450, 5460, 5470\*.

\* All students must take either PSYC 5410 or 5470.

\*\*A “developmental related course” from another division/department can substitute for one of these courses (other than PSYC 5410 or 5470), as per list of pre-approved courses or by permission of Developmental Psychology faculty.

**Pre-Master’s Required Courses:** GRAD 5950, 5960; PSYC 5104, 5105, 5400\*, 5499\*; PSYC 5800\* or 5801\*.

\* To be taken each semester.

**Post-Master’s Required Courses:** GRAD 6950, 6960; PSYC 5400\*, 5499\*; PSYC 5800\* or 5801\*.

\* To be taken each semester.

**Industrial and Organizational Psychology Concentration M.A. Required Courses:** Nine credits of GRAD 5950; PSYC 5104, 5105, 5123, 5600, 5614, 5615, 5699, 5701; MGMT 6203.

**Doctor of Philosophy Required Courses:** Four courses in Industrial and Organizational Specialization Seminars by degree’s end; nine credits in Departmental Breadth Seminars; 15 credits of GRAD 6950; GRAD 6930; PSYC 5600, 5699; and Field Research Experience or equivalent.

**Doctor of Philosophy Degree Milestones:** Master’s Defense; General Examination; Dissertation Proposal; and Dissertation Defense.

**Ecological Psychology Concentration Required Courses:** PSYC 5104, 5553, 5554, 5571, 5574; STAT 5665; and one of the following courses: PSYC 6505; PSYC 5570 when taught as Current Topics in Cognitive Science: Developmental Systems, or Introduction to Complex Systems, or Longitudinal Data Analysis; or STAT 5825.

**Language and Cognition Concentration Required Courses:** PSYC 5567, 5568; four courses taught by the Language and Cognition faculty; three breadth courses taught outside the Language and Cognition division; a two course sequence in statistics, including PSYC 5104 or 5105.

**Neuroscience Concentration Required Courses:** PSYC 5104, 5105; four semesters of Behavioral Neuroscience (BNS) seminars; two graduate-level BNS courses from two different areas of expertise, taught by different BNS psychology professors; at least six credits of graduate research. For the Ph.D., students must obtain at least 24 total credits in addition to any credits going towards the master’s degree.

**Neuroscience Concentration, Master’s Only Option Required Courses.** At least 30 total credits, including no more than six at the undergraduate level; PSYC 5104; two to four semesters of Behavioral Neuroscience (BNS) Seminar; for terminal Master’s students, two semesters are required, but it is recommended that the student enroll each semester in the program up to the fourth semester. For Ph.D. students who are initially obtaining a master’s, four semesters are required; two BNS courses with at least one graduate content course from each of two different areas of expertise taught by different BNS psychology professors; and at least six credits of graduate research.

**“Plan A” Additional Requirements.** A master’s thesis, with an oral defense and a committee of three faculty members. At least three to four semesters in the program are recommended.

**“Plan B” Additional Requirements.** A written master’s examination is required, consisting of either three questions from different faculty members (at least two in Behavioral Neuroscience), which each serve as the basis for a 10-15 page paper to be completed in 7-10 days.; or a research report or literature review, which is reviewed by the master’s committee.

**Social Psychology Concentration Requirements.** Students must take at least one seminar from three different social psychology faculty members across their tenure in the program.

**Pre-Master’s Required Courses:** PSYC 5104, 5105, 5700, 5701, 5703, 5799; at least one of the following each semester: PSYC 5800; GRAD 5950, 5960.

**Post-Master’s Required Courses:** PSYC 5770, 5799, 6790; at least one of the following each semester: GRAD 6950, 6960; PSYC 5800.

**Post-Master’s Social Breadth Requirement.** Students select three courses from PSYC 5101, 5120, 5170, 5770, 6730, 6731, 6732, 6733, 6750, 6753, or 6771.

## Public Administration (M.P.A.)

The Department of Public Policy offers a graduate program leading to a Master of Public Administration (M.P.A.). The M.P.A. program provides students with a dynamic and integrated approach to the field of public management. It prepares students for leadership positions in the public, nonprofit and private sectors. It is accredited by the Network of Schools of Public Policy, Affairs, and Administration (NASPAA). A Fast-Track to the M.P.A. program is also available to currently enrolled University of Connecticut undergraduate students; this program enables students to take graduate level courses while completing their undergraduate degree. Fast-Track students can take enough credits as an undergraduate student to complete the M.P.A. degree in one year.

### Master of Public Administration Requirements

The M.P.A. degree is comprised of 43 credits. These credits include 27 credits of core coursework (nine courses), nine credits of electives in a focus area (three courses), six credits of internship and a one credit capstone portfolio.

**Master of Public Administration Fellows Track.** The Fellows track within the M.P.A. degree program is designed specifically to develop sophisticated and conscientious managers who have the needed skills and competencies to be effective leaders. Individuals in public, nonprofit or private sector organizations with at least five years of professional experience are eligible for the Fellows program. Students earn an M.P.A. degree. The Fellows track of the M.P.A. program consists of 36 credits: eight of the nine core M.P.A. courses (24 credits), elective credits within an executive leadership focus area (11 credits), and a capstone portfolio (1 credit). The M.P.A. program's internship requirement and the required core course PP 5345 are waived for M.P.A. Fellows. M.P.A. Fellows may choose to take PP 5345 as an elective course.

**Master of Public Administration Required Core Courses:** PP 5325, 5340, 5345, 5361, 5364, 5365, 5370, 5375, and 5376 to total 27 credits.

**Focus Area.** Students complete nine credits of electives in areas that support their career goals. M.P.A. focus areas include public finance and budgeting, nonprofit management, social policy, and public policy. Working with their advisor, students may choose to pursue a more generalist approach and select electives across multiple areas or to create their own focus area.

**Internship.** Six credits of PP 5390.

**Capstone.** One credit of PP 5372.

## Public Policy (M.P.P.)

The Department of Public Policy offers a graduate program leading to the degree of Master of Public Policy (M.P.P.). The M.P.P. program provides instruction in policy analysis and program evaluation. The focus is on providing students with the rigorous analytic and quantitative skills needed to assess policies and to evaluate programs. A Fast-Track to the M.P.P. program is also available to currently enrolled University of Connecticut undergraduate students; this program enables students to take graduate level courses while completing their undergraduate degree. Fast-Track students can take enough credits as an undergraduate student to complete the M.P.P. degree in one year.

### Master of Public Policy Requirements

The M.P.P. degree is comprised of 43 credits. These credits include 27 credits of core coursework (nine courses), nine credits of electives (three courses), six credits of internship and a one credit capstone portfolio. The curriculum is outlined below.

**Required Core Courses:** PP 5314, 5331, 5340, 5342, 5347, 5361, 5370, 5375, and 5376 to total 27 credits.

**Focus Area.** Students complete nine credits of electives in areas that support their career goals. M.P.P. focus areas include public finance and budgeting, nonprofit management, social policy, and public administration. Students can also choose, with the advice of their advisor, to pursue a more generalist approach and select electives across multiple areas or to create their own focus area.

**Internship.** Six credits of PP 5390.

**Capstone.** One credit of PP 5372.

## Quantitative Economics (M.S.)

The Department of Economics offers a Master of Science in Quantitative Economics (MSQE). The MSQE program is a professional degree that combines training in economic theory with training in quantitative methods/tools that can be used to analyze economic and other data, including "big data."

### Master of Science Requirements

At least 30 credits maintaining at least a "B" average. Of these 30 credits, 27 must come from required MSQE core courses, and three or more are from electives approved by the student's major advisor.

**Required Core Courses:** ECON 5201, 5202, 5301, 5311, 5312, as well as one graduate course in Economics in each of the following: Programming and Computation with R, Open Source Programming with PYTHON, Panel Data Econometrics, and Big Data Analysis.

## Sociology (M.A., Ph.D.)

The graduate program at the University of Connecticut is a Ph.D. program where students attain a Master of Arts (M.A.) degree in the process of obtaining the Doctor of Philosophy (Ph.D.). We do not admit students who are only interested in a M.A. degree in Sociology. Most students enter with a Bachelor of Arts (B.A.) and obtain the M.A. in Sociology in the first two years of the program, then proceed to the Ph.D. Students who are admitted with the M.A. in Sociology from another institution will typically finish the Ph.D. program in a shorter time. Students entering with the M.A. from other universities may have to take some required coursework in order to cover equivalent material as students who attained their degrees at the University of Connecticut. Students entering with graduate degrees in disciplines other than Sociology must fulfill the requirements of both the M.A. and Ph.D.

### Master of Arts in Sociology

In addition to Graduate School requirements, the M.A. in Sociology requires a minimum of 37 credits. Fifteen credits are Sociology graduate elective courses. Nine credits are GRAD 5950 Master's Thesis Research. The other credits are from the following required courses.

**Required Courses:** SOCI 5001, 5201, 5203, 5231, and 5251.

**Plan A.** In addition to 37 Sociology credits, students must also complete a M.A. thesis, which includes submitting a written thesis and passing a formal M.A. thesis defense.

**Plan B (Terminal).** Students who do not wish to continue in the program may submit a portfolio instead of a M.A. thesis. This should consist of a minimum of three papers that together illustrate a command of sociological theory, research methods, and at least one substantive area. Students cannot move on to the Ph.D. phase of the program if they take the Plan B option.

### Doctor of Philosophy in Sociology

The Ph.D. requires a minimum of 30 credits beyond the M.A. degree: 27 credits in Sociology and three GRAD 6950 credits. Students must also either demonstrate proficiency in a foreign language or take an additional six credits of graduate coursework in an outside area. Fifteen Sociology credits may be graduate elective courses. The other credits are from the following required courses.

**Required Courses:** SOCI 6203, 6231, and 6251.

**Foreign Language Proficiency/Outside Area Requirement.** Students must demonstrate proficiency in a foreign language. This requirement can also be satisfied by taking an additional six credits of graduate seminars in one or more other units.

**General Examination.** Students must demonstrate mastery over a particular area of sociological expertise. The General Examination has both a written and oral component.

**Dissertation Proposal.** Students must also complete a dissertation proposal, which includes submitting a written proposal and passing a formal dissertation proposal defense.

**Dissertation.** The dissertation has both a written and oral component.

## Speech, Language, and Hearing Sciences (M.A., Ph.D., Au.D.)

The Department of Speech, Language, and Hearing Sciences (SLHS) offers three graduate degrees: Master of Arts (M.A.), Doctor of Audiology (Au.D.), and Doctor of Philosophy (Ph.D.). The M.A. and Au.D. degrees are professional degrees that prepare students for clinical certification and State licensure in the fields of speech-language pathology (SLP) and audiology. Also, through an arrangement with the Neag School of Education, students enrolled in the M.A. program in SLHS can fulfill requirements leading to certification as an SLP for employment in Connecticut's public schools. The M.A. is a two-year program (four semesters plus one summer) with the option of a three-year program (six semesters plus one summer) for students without pre-professional undergraduate coursework in SLHS. The Au.D. degree is a four-year post-baccalaureate program that includes three years of coursework and clinical experiences plus a one-year equivalent full-time residency. The M.A. and Au.D. degrees are accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology. The Ph.D. program prepares students for research and teaching careers in SLHS. Students can specialize in areas including normal processes of speech, language and hearing, disorders of speech, language and hearing both developmental and acquired, and the prevention, treatment or management of these disorders.

### Master of Arts Requirements

In addition to the Graduate School requirements, a M.A. degree in Speech-Language Pathology requires satisfactory completion of a minimum of 57 credits and 375 hours of clinical practicum while maintaining at least a "B" in both academic coursework and clinical work. Students must complete all required courses and clinical practicum in order to obtain both their M.A. degree, and their Certificate in Clinical Competency through the American Speech-Language-Hearing Association. The first year of the two-year M.A. program consists of required graduate courses and clinical practicum, and the first year of the three-year M.A. program consists of required pre-professional undergraduate courses. During the final year, students complete the remaining required courses, and either GRAD 5950 or SLHS 5374. Students are also required to complete an additional six credits of course work in an area interest. At least three of the credits must be from graduate courses taken within the SLHS department. The Master of Arts required courses are listed below.

**Master of Arts Clinical Practicum.** SLHS 5336 each semester and SLHS 5302 in May Term/Summer I.

**Master of Arts Language Disorders Required Courses:** SLHS 5342, 5343, 5348, and 5349.

**Master of Arts Speech Disorders Required Courses:** SLHS 5335, 5345, 5346, 5353, and 5359.

**Master of Arts Speech Science and Research Required Courses:** SLHS 5361, 5377, and 5374 or GRAD 5950.

**Master of Arts Area of Interest Courses.** Students must take six credits of additional coursework in an area of interest as part of their degree requirement. These courses may vary in topics such as disabilities, diversity and multiculturalism, education, and medical speech language pathology to list a few. These courses are typically offered within the department (e.g., SLHS 5376 Language Impairments and Literacy, SLHS 5378 Augmentative Alternative Communication in Speech-Language Pathology, SLHS 5380 Advanced Topics in Medical Speech Pathology, SLHS 6123 Bilingualism in Typical and Atypical Populations; Language and Cognition). One three credit course may be taken outside the department if approval is obtained from the student's academic advisory committee.

### Doctor of Audiology Requirements

It is expected that students will earn a minimum of 1,820 clinical hours during full-time enrollment in the graduate program and a minimum of 75 credit hours. Didactic coursework and clinical experiences are designed to allow students to acquire knowledge and skills in six broad areas of audiology: foundations of practice, prevention/identification of hearing loss and balance disorders, assessment hearing and balance disorders, (re) habilitation of hearing and balance disorders, advocacy/consultation, and education/research/administration. Students are also required to complete

a capstone research project and pass qualifying examinations in years one and three of the program.

**Doctor of Audiology Required Courses:** SLHS 5321, 5322, 5323, 5324, 5325, 5326, 5344, 5351, 5354, 5362, 5369, 5372, 5373, 5375, 5400, 5401, 6401, 6402, 6410. Students are required to take three credits of a graduate level statistics course such as EPSY 5309 and three elective credits also at the graduate level. Selection of the appropriate statistics and elective courses should be made in consultation with the major academic advisor.

Students are required to register for clinical practicum (SLHS 5337) for each semester of the first three years of the program beginning in the second semester of study. Students are required to register for GRAD 6930 or 6998 in their final year of study when they complete their clinical externship. Students are also required to complete a capstone research project taking a minimum of six credits of SLHS 6319 (Research Practicum) and pass qualifying examinations in years one and three of the program.

### Doctor of Philosophy

Specific course requirements for the Ph.D. in SLHS are determined by the student's advisory committee consistent with the minimum requirements specified by the Graduate School and the Department as noted below. SLHS does not have a foreign language requirement. Doctor of Philosophy requirements are listed below.

**Foundations Courses.** Students are expected to take coursework in an area of concentration. The coursework will be selected in consultation with the academic advisor and the advisory team.

**Research Methodology Required Courses:** SLHS 6368 or EPSY 6103; nine credits in research design, statistics, and possibly computer programming. Courses may be taken in Educational Psychology, Psychology, Statistics or other departments. Each department has a recommended three-course sequence (e.g., EPSY 5605, 5607, 5610 or 5613; STAT 5505, 5605, 5665). In addition, students will enroll each semester for at least one credit of research practicum, SLHS 6319.

**Laboratory Rotations.** To obtain experience in different research methodologies, each student will be required to complete two laboratory rotations, lasting a minimum of one semester. During the rotation, students will enroll in SLHS 6319. The laboratory rotation must be approved by the student's adviser.

**Projects.** Students will be required to complete two research projects during their first two to three years of the program (first and second projects) and may be connected with a laboratory rotation. These projects will involve experiment design, data collection, analyses, preparation of a potentially publishable manuscript or grant application, and an oral presentation of the research findings.

**General Examination.** The general examination may be taken when 75% of the content coursework is completed. The examination format may vary but it will consist of both written and oral components. Both portions must be passed within two attempts.

**Prospectus.** Students must submit a prospectus in the form of a grant application. This is typically done at the end of the third year of the program, after successfully passing the general examination.

**Dissertation.** Consists of written and oral components that reflect the student's focused area of research.

## Statistics (M.S., Ph.D.)

The Department of Statistics offers programs leading to Master of Science (M.S.) in Statistics and Doctor of Philosophy (Ph.D.) degrees. (The Department also offers a Professional M.S. in Biostatistics). All programs include training in statistical application and theory, and give students sufficient flexibility to pursue their special interests as well as time to take courses in other departments at the University of Connecticut.

### Master of Science

The M.S. in statistics program normally requires 31 credits. While it is possible to complete the M.S. degree within a year, most students will need three to four semesters. The core courses of the program cover mathematical statistics, linear models, design of experiments, and applied statistics. The program also requires one to two courses in areas of application. The plan of study may be formulated with related work in almost any area, e.g.,

Biology, Economics, Nutrition, and Psychology. Students are encouraged to participate in statistical consulting projects done by members of the Department. To make acceptable progress through the program, three semesters of calculus and a semester of linear algebra in college are necessary. A background in statistics will be helpful, but is not assumed.

**Master of Science Required Courses:** STAT 5505, 5605, 5585, 5685, 5725, 5515, and 5099. The elective courses normally should consist of four additional courses, two to three in statistics and one to two from other departments. The final requirement is passing the Master's Examination which is a written test on basic understanding of course materials. There is no thesis requirement. In order to be considered for a possible switch to the Ph.D. program or for financial support, a M.S. in Statistics student must first clear the Ph.D. Qualifying Examination.

### Doctor of Philosophy

The Ph.D. program emphasizes development of the ability to generate novel results in statistical methods, statistical theory, or probability. Individuals with a Bachelor's degree in any major, with a background in mathematics and statistics are encouraged to apply. The course work typically consists of at least 16 graduate level courses that cover a wide range of topics, including mathematical statistics, linear models, statistical inference, applied statistics, real analysis, and probability. After completing the necessary course work and a sequence of examinations, a Ph.D. candidate must complete a dissertation that makes an original contribution to the field of statistics or probability. The dissertation may be predominantly development of novel statistical methodology for an area of application.

**Doctor of Philosophy Requirements.** For students entering the program after a Bachelor's Degree, typically 16 to 18 courses are required. An individual plan of study is developed by the student and his or her Advisory Committee. Knowledge of a sequence of core courses is required for all Ph.D. students. These courses are STAT 5585, 5685, 5505, 5605, 5725, 6694, 6315, 6515, 6325, 6894, and 5515, totaling 33 credits for core courses. Additional credits can be earned from the list of elective courses. In general, Ph.D. students are required to elect one to two courses from other departments. However, it is sufficient to take one graduate level course from the Department of Mathematics. Each elected course must be approved by the major advisor of a student. Under certain circumstances, the major advisor can exempt the student from the above requirement, if the student has had internships or Research Assistantships in interdisciplinary areas. The Department has no requirement on foreign languages. The first formal requirement for the Ph.D. degree is passing the Ph.D. Qualifying Examination which is a written test on certain basic courses. The second requirement is passing the General Examination that consists of an oral test on aspects of Applied Statistics, Linear Models, Probability Theory and Statistics and a presentation of a thesis research proposal. The preparation of a dissertation then follows which must present an original contribution to the general area of Statistics and/or Probability. The final requirement is a defense of the Ph.D. dissertation before an audience of interested members of the Department. The Department expects every Ph.D. student to strive to finish their study within four years. For students arriving without a M.S. degree in Mathematics or Statistics, the Department may provide up to five years of financial support. For those arriving with such a degree, the Department may provide up to four years of financial support.

## Survey Research (M.A.)

The Department of Public Policy offers a graduate program leading to a Master of Arts (M.A.) in Survey Research. The program prepares survey research professionals, in both traditional and cutting-edge methodologies, to gather data about attitudes, opinions, behaviors, or demographics and analyze that information to answer complex questions about society. The Graduate Program in Survey Research delivers high-quality instruction in qualitative and quantitative data collection and data analysis techniques through a robust online delivery platform.

### Master of Arts Requirements

The M.A. degree requires a minimum of 30 credits. The following courses are recommended for completion of the master's degree. Master's degree students and their advisors decide the most appropriate course of study. During the final semester of study, all Master's degree students are required to submit a cumulative portfolio which serves as a comprehensive examination.

**Master of Arts Recommended Courses:** PP 5379, 5383, 5376, 5385, 5377, 5386, 5397, and 5390\*.

Two of the following (\*more if substituting PP 5390): PP 5387, 5382, 5384, 5322, 5332; PP 5397 when taught as Applied Survey Analysis SPSS, R, and Stata; and PP 5397 when taught as Multicultural/Multi-population Research.

\* Students with two years of relevant work experience may substitute coursework for the internship with approval.

## Systems Genomics (Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, and UConn Health.*

The Institute for Systems Genomics offers a Doctor of Philosophy (Ph.D.) in Systems Genomics.\* A Ph.D. in Systems Genomics trains students to take leadership roles in basic research, clinical research, program management and consultation at the Ph.D. level in the areas of Genome Sciences and Personalized Genomic Medicine. Systems Genomics students will receive specialized training in one or more of the areas listed below.

**Integrated Life Sciences.** Mechanisms of inheritance; genetics and genomics of human disease; stem cell biology; molecular biology including genomic technology; neurobiology and behavioral genetics and genomics.

**Integrated Mathematics, Statistics and Computer Science.** Computational methods in systems biology; bioinformatics analysis of high-throughput data; such as Next-Generation Sequencing (NGS) or mass spectrometry data; facility with data bases relevant to systems genomics and network biology.

**Integrated Personalized Health Care and Ethical, Legal and Social Implications (ELSI).** Interdisciplinary competency in human genomic diagnostics, laboratory diagnostics, health care ethics, and regulatory issues in the clinical laboratory.

### Requirements for Ph.D. in Systems Genomics

Except in special cases, Ph.D. candidates will complete required coursework within the first two years of enrollment in the program. The first year of coursework will focus on "Foundations of Systems Genomics." The second year will focus on "Advanced Topics in Systems Genomics." Specific course requirements are determined by the student's Advisory Committee consistent with the minimum requirements specified by the Graduate School. The Ph.D. in Systems Genomics does not have a related area or foreign language requirement, unless one is specified by the Advisory Committee.

\* This program is not accepting new applicants at this time.

# Neag School of Education

## Curriculum and Instruction (M.A., Ph.D.)

Graduate programs in Curriculum and Instruction lead to degrees of Master of Arts (M.A.) and Doctor of Philosophy (Ph.D.). (The Neag School of Education also confers a Sixth-Year Diploma in Professional Education, which are described elsewhere.) Students can enter the Master's program through one of two routes. The first is through the teacher education/preparation track, which has two paths: the Integrated Bachelor's/Master's (IBM) degree program, which is intended for undergraduates at the University of Connecticut who continue on for a fifth year to earn an M.A. degree, and the Teacher Certification Program for College Graduates (TCPCG), which is intended for students who have already completed an undergraduate degree in a major unrelated to education. Alternatively, students can enter the program for reasons other than standard teacher preparation. This route is available, for example, to individuals who are already teachers and may be seeking additional certification. Master and doctoral programs of study are offered in the following areas of concentration: bilingual and bicultural education, elementary education, reading education, and secondary education with one of the following concentrations: English Education, World Language Education, History and Social Studies Education, Mathematics Education, and Science Education. In addition, students can earn an M.A. in Curriculum and Instruction with an area of concentration in Secondary Education: Agricultural Education, Music Education, Reading and Language Arts Consultant, or Remedial Reading and Language Teacher. The M.A. degrees in Reading and Language Arts Consultant or Remedial Reading and Language Teacher may provide a vehicle, as appropriate, for the fulfillment of certification requirements.

### Master of Arts Requirements

Requires satisfactory completion of at least 30 credit hours maintaining at least a "B" average. Each plan of study is a non-thesis plan requiring a culminating activity or exam as indicated. There are six different sets of requirements, which depend on the specific route/path the student is in.

### Integrated Bachelor's/Master's (IBM)

#### IBM Elementary and Secondary Education Required Courses

Required courses for Elementary Education and all Secondary Education concentrations: EPSY 5195 for two credits; EDCI 5092 for three credits; EDCI 5093 for four credits; EDCI 5094 for three credits; and EDCI 5095 for three credits. Three credits of one of the following: EDCI 5700, 5715, 5720, 5740, 5742, 5750, 5875, 5890, or 5895. Three credits of EDLR 5015. Required courses should total 21 credits.

**IBM Elective Required Courses:** Nine credit hours aligned with content specialty selecting courses in EDCI, EDLR, and EPSY or Graduate Liberal Arts courses totaling nine credit hours.

**Exam/Culminating Portfolio Requirement.** Will be directed by the student's advisor.

#### IBM Music Education Required Courses

EPSY 5195 for two credits; EDCI 5092 for three credits; EDCI 5093 for four credits; EDCI 5094 for three credits; EDCI 5095 for three credits. One of the following three credit courses: EDCI 5700, 5715, 5720, 5740, 5742, 5750, 5875, 5890, or 5895. Also required are EDLR 5015 and EDCI 5041. Required courses should total 24 credits.

**IBM Elective Required Courses:** EDCI 5040 and 5047; or related, approved courses (musical theatre, world music, folk music, etc.) totaling six credits.

**Exam/Culminating Portfolio Requirement.** Will be directed by the student's advisor.

### Teacher Certification Program for College Graduates (TCPCG)

#### TCPCG Secondary Education Plan B (Non-Thesis) Required Courses

EDCI 5050, 5055, 5060, 5065, 5070, 5080, 5085, 5825, 5830, 5875; nine credits of EDCI 5090; three credits of EDCI 5830; EPSY 5108. Required courses total 42 credits.

**Required Elective:** A three credit Education or Graduate Liberal Arts course.

**Exam/Culminating Portfolio Requirement.** Will be directed by student's advisor (not filed with the Graduate School by prior arrangement).

### Concentrations in Bilingual and Bicultural Education, Elementary Education, Reading Education, or Secondary Education (All Specializations but not in the IBM or TCPCG programs) Required Courses:

Three courses from the following two areas, with at least one course from each area, totaling nine credits. Social Justice/Human Rights: EDCI 5700, 5875, 6860. Learner: EDCI 5742; EPSY 5108, 5710, 5750. Three credits from Literacy and Language course options: EDCI 5100, 5110, 5125, 5130, 5135, 5140, 5145, 5250, 5255, 5605, 5715, 5720, 5742, 5750, or 5890. Three credits from Assessment Literacy course options: EDCI 5145, 5765; EPSY 5602.

**Content Course Requirements.** Students must also complete 15 credit hours in their area of concentration chosen from the categories below.

**Bilingual and Bicultural Education:** EDCI 5605, 5700, 5705, 5710, 5715, 5720, 5740, 5742, 5745, 5750, 5755, 5760, 5765, 5770, 5775, 5780, 5895, 6860.

**Elementary Education in Math, Science, Reading, Language Arts, Social Studies, or Children's Literature:** EDCI 5100, 5105, 5110, 5130, 5350, 5460.

**Reading Education:** EDCI 5100, 5105, 5110, 5115, 5120, 5125, 5130, 5135, 5140, 5145, 5150, 5250.

**Secondary Education Agriculture Education:** EDCI 5369, 5450, 5455, 5465, 5500, 5550.

**Secondary Education English Education:** EDCI 5125, 5135, 5140, 5250, 5255.

**Secondary Education Math Education and/or Science Education:** EDCI 5369, 5450, 5455, 5465, 5500, 5550.

**Secondary Education History and Social Studies Education:** EDCI 5355, EDCI 5360, EDCI 5830.

**Secondary Education World Language Education:** EDCI 5600, 5890.

**Other Course Options.** In addition to the EDCI courses listed in each content area above, students may elect additional courses approved by their advisor and these will most often be either Liberal Arts courses or related education courses (EDCI, EPSY, and EDLR).

**Exam/Culminating Portfolio Requirement.** Report of exam submitted to the Graduate School.

**Concentration in Remedial Reading and Language Arts Teacher Requirements.** The following areas of study are required. Choices are dependent upon discussion with the advisor.

**Early/Intermediate Reading/Writing:** Three credits in Reading: EDCI 5100, 5115, or 5125 and three credits in Writing/Language Arts: EDCI 5105 or 5110; three credits of Secondary Reading: EDCI 5125 or 5135; three credits in Disciplinary Literacy/Content Area Reading: EDCI 5140; three credits in Literature EDCI 5130 or 5250; six credits in Diagnosis and Remediation: EDCI 5145 and 5150 (EDCI 5120 if approved by advisor); six credits of Advanced Clinical Practicum EDCI 5155.

**Elective Course Options.** Determined in consultation with the advisor: three credits of EPSY 5108; general Liberal Arts courses; Independent Study EDCI 5099; other education course(s) in EDCI, EPSY, or EDLR.

**Concentration in Reading and Language Arts Consultant Course Requirements:** EDCI 5160; six credits of EDCI 5092.

**Elective Course Options.** Selections are based on the student's transcript and prior course work. Suggested courses: six credit hours from EDCI 5100, 5105, 5110, 5115, 5125; three credits from EDCI 5135 or EDCI 5125; three credits of EDCI 5140; three credits of EDCI 5130, or 5250; six credits from EDCI 5120, 5145, or 5150; six credits of EDCI 5155; EPSY 5108; three credits of EDCI 5099; related courses in language and/or literacy, curriculum, educational psychology, or educational leadership (EDCI, EPSY, EDLR).

**Exam/Culminating Portfolio Requirement.** Report of exam submitted to the Graduate School.

## Doctor of Philosophy

The Plan of Study for a Doctor of Philosophy (Ph.D.) in Curriculum and Instruction is designed to cultivate beginning expertise in five areas central to scholarly work: Disciplinary Knowledge, Curriculum and Instruction, Professional Skill, Research Methods, and Research Performance. Each area is outlined below. While minimum credit levels are set for each area, the development of emerging expertise in these areas will likely necessitate additional courses or other experiences determined by the student and advisor in consultation. A suggested list of possible courses from which to choose for each area is provided. The doctorate requires satisfactory completion of at least 24 credit hours maintaining at least a “B” average, as well as all other requirements of the Graduate School (e.g., 15 credit hours GRAD 6560 or 6950). In addition to required coursework, candidates complete a comprehensive doctoral exam, prepare and present a proposal for their dissertation study, prepare and defend their dissertation.

**Disciplinary Knowledge.** A minimum of six credits of the EDCI 6094, doctoral seminar (or equivalent doctoral seminar) designed to provide in-depth exploration and discussion of current topics, issues, and research in a disciplinary area. Options include: three credit hours of EDCI 6094 for a specific topic; three credit hours of EDCI 6094 when repeated with a new topic; three credit hours of an equivalent course, seminar, or independent study; additional credit hours of EDCI courses.

**Curriculum and Instruction.** A minimum of six credits must be taken through a departmental Proseminar across two semesters that focuses on the history, models, theory, and issues in teacher education. These six credits are typically taken during the first year of doctoral study. Options for earning the minimum six credits include: three to six credits of EDCI 6094; three credits of an equivalent course, seminar, or independent study; additional credit hours of EDCI courses.

**Professional Skill.** A minimum of six credits must be taken toward initial mastery of professional skills for grant writing, writing for research and professional publication, and teaching courses at the undergraduate and graduate levels. Course options include: EDCI 6010, 6094, 6103; three credits of an equivalent course, seminar, or independent study.

**Research Methods.** A minimum of 12 credits in research methodology must be taken. The distribution of coursework is established by the Advisory Committee with the doctoral student’s professional goals in mind but is ordinarily a combination of quantitative and qualitative courses to ensure breadth of knowledge for evaluating and conducting rigorous research. Course options include: EDCI 5760, 5824, 6000, 6005, 6860; EPSY 5602, 5603, 5605, 5607, 5613, 5621, 6052, 6601, 6611, 6621, 6626, 6635, 6636, 6637.

**Research Performance.** A minimum of 15 credits of GRAD 6950 or 6960, Doctoral Dissertation, is required while completing the dissertation research study.

**Electives.** Identified by the student in consultation with their advisor.

**Culminating Requirements.** Candidates must complete a General Examination with a written and oral component; a dissertation proposal with a written proposal and oral defense of the proposal; a final examination with an oral defense of the written dissertation.

## Educational Leadership (Ed.D.)

The Doctor of Education (Ed.D.) in Educational Leadership is intended to address the need for visionary educational leaders. Students in this cohort program are currently employed professionals seeking a terminal degree that combines theory, problem solving, and skill development to change and enhance the work of educational organizations. Course work focuses on the critical analysis of problems of practice and covers issues of policy, leadership, social justice and equity, organizational and adult learning, and research methods.

### Doctor of Education Requirements

A part-time 41-credit cohort program divided into three distinct phases and culminates in a Capstone project that is empirical in nature and includes original research. Required courses are listed below.

**Year One Courses:** EDLR 6055, 6314.

**Year One Summer Practicum:** EDLR 6092, Critical Reading of Literature.

**Year Two Fall Semester Courses:** EDLR 6465, 6467.

**Year Two Spring Semester Courses:** EDLR 5202, 6052, 6312.

**Year Two Summer Practicum:** EDLR 6092, Methods/Theory.

**Year Three Fall Semester Course:** EDLR 6050.

**Year Three Spring Semester Course:** GRAD 6950.

**Year Four Fall Semester:** GRAD 6950 for data collection and Capstone writing. A total of nine credits of GRAD 6950 is required by the Graduate School.

## Educational Psychology (M.A., Ph.D.)

The Master of Arts (M.A.) and Doctor of Philosophy (Ph.D.) degrees in Educational Psychology may be taken with concentrations in the areas of: Cognition, Instruction, and Learning Technology; Educational Technology (M.A. only); Giftedness, Creativity, and Talent Development; Research Methods, Measurement, and Evaluation; Counselor Education and Counseling Psychology; School Psychology; and Special Education.

Cognition, Instruction and Learning Technology M.A. and Ph.D.

The Cognition, Instruction and Learning Technology (CILT) program approaches learning and instruction from an applied view of the Learning Sciences and aims to prepare scholars and practitioners who are well versed in different perspectives on teaching and learning and capable of critically evaluating the effectiveness of instructional technologies and techniques across different populations and contexts (including virtual, traditional face-to-face, and blended). The M.A. and the Ph.D. requirements in CILT conform to the Graduate School requirements. Specific programmatic requirements and course sequences for M.A. and Ph.D. students are described below.

### Master of Arts

Requires a minimum of 30 credits comprised of core (see below) and elective courses. Two different options exist for students who seek the master’s degree. These options pertain to a thesis (Plan A) or non-thesis (Plan B) option, related to a student’s graduate plan of study. For Plan A, students complete a reduced plan of coursework (21 credit hours) plus nine credits of Master’s thesis research (GRAD 5950 or 5960) and defense of a research-based thesis. “Plan B,” the non-thesis option, requires a 30 credit plan of coursework, followed by a comprehensive examination. In general, the thesis option is preferred, especially if the student intends to complete doctoral degree requirements. The list below represents courses typically included in the plan of study for the CILT M.A. degree. Waivers and substitutions for these courses are allowed with approval from the student’s primary advisor and advising committee.

**Master of Arts Core Courses:** EPSY 5510; one credit of EPSY 5515; EPSY 5520, 5530, 5601, 5602, 5605, 5607, and 5220.

### Doctor of Philosophy

The Ph.D. program is structured to prepare scholars and practitioners whose primary interests involve issues of cognition, instruction, learning, and technology. Although the Cognition, Instruction and Learning Technology (CILT) Ph.D. program is designed to encourage full-time graduate study, several students work part-time in the community. In most cases, these part-time positions are related to the student’s graduate program and consequently may even enhance the student’s skills, professional maturity, and overall educational goals. Students are expected to complete all required courses and complement required coursework with elective coursework related to their specific research interests and professional goals. In addition to required coursework, students are required to pass a comprehensive examination and defend a dissertation proposal before their advisory committee and readers. Students must complete all other dissertation requirements as specified by the Educational Psychology Department and the Graduate School. The list below represents courses typically included in the plan of study for the CILT Ph.D. degree. Waivers and substitutions for these courses are allowed with approval from the student’s primary advisor and advising committee.

**Doctor of Philosophy Core Courses:** EPSY 5510; two credits of EPSY 5515; EPSY 5220, 5520, 5530, 5540, 5602, 5605, 5607, 5610, 5613, 5621, 6601; a minimum of 15 credits of GRAD 6950.

**Counselor Education and Counseling Psychology M.A. and Ph.D.**

The Counseling Program offers two graduate-level degrees: a Master of Arts (M.A.) degree in Educational Psychology in the area of Counselor Education and Counseling Psychology, and a Doctor of Philosophy (Ph.D.) in the area of Counselor Education and Counseling Psychology. (In addition, the Counseling Program offers a Sixth-Year Diploma). The M.A. prepares students to be fully-certified School Counselors in the State of Connecticut and are accredited by the State of Connecticut and the Council for Accreditation of Counseling and Related Educational Programs (CACREP). The Ph.D. program prepares students for research and teaching careers in Counselor Education or related fields. All programs in the Counseling Program emphasize educational equity and academic access and opportunity as related to eliminating cultural oppression.

**Master of Arts Counselor Education and Counseling Psychology Requirements.** In addition to the Graduate School requirements, students in the Master of Arts (M.A.) program in Counselor Education and Counseling Psychology must complete the following requirements. Continuation in the Master's level Counselor Education and Counseling Psychology Program is based on ongoing acceptable performance in meeting all the following criteria: earn grades of "B" or better in each of the counseling courses and seminars; maintain a GPA of 3.0 or higher in their counseling and related program coursework; demonstrate the ability to work successfully with K-12 students in field placement settings throughout the program. Site supervisors evaluate students by using a program designed evaluation instrument aligned with program standards. Students must receive consistently positive evaluations from site supervisors to continue in the program. The M.A. Degree in Counselor Education and Counseling Psychology requires a minimum of two full academic years, defined as four semesters of approved graduate-level study with a minimum of 51 credits. To qualify for National Certification and the Licensed Professional Counselor exam, students must complete 60 credit hours in their Master's Degree Program of Study. Thus, courses beyond the minimum 51 credits needed to graduate in the Counselor Education and Counseling Psychology M.A. Program can be of your own choosing.

**Practicum.** Students complete supervised counseling practicum experiences that total a minimum of 100 clock hours over a full academic term that is a minimum of 10 weeks.

**Internship.** All school counseling students will complete a supervised internship. As of December 1, 2017, the Connecticut State Department of Education will accept a minimum of 700 clock hours of internship over 10 school months to fulfill this requirement.

**Final Examination.** Students must pass a Comprehensive Exam in order to graduate from the Counselor Education and Counseling Psychology Program. The National Counselor Exam (NCE) is optional, and required only if students want to become nationally certified.

**Required Courses:** EPSY 5108, 5195, 5301, 5304, 5306, 5307, 5308, 5314, 5315, 5316, 5317, 5318, 5319, 5320, 5406, and 5601.

**Doctor of Philosophy in Counselor Education and Counseling Psychology.** The Ph.D. program is designed to be completed in two to four years, depending on experience as a school counselor. Due to course sequencing, students are normally only admitted for the Fall semester. Before entering the program, all students must possess at least a Master's degree in counseling, preferably school counseling. This degree in counselor education is geared towards students finding jobs in academia as a faculty member, or in other capacities on a college or university campus. Students choose from among the following specializations based on their interests and career goals: social justice and educational equity; program evaluation; qualitative and quantitative research methodology; gifted and talented education; positive behavioral supports; primary prevention; and licensure as a professional counselor.

**Teaching.** To build their credentials as future professors, all Ph.D. students will be encouraged to teach (under supervision) in order to gain skills in this area.

**Seminar.** Doctoral students will be expected to participate in a bi-weekly repeating doctoral seminar.

**Required Courses.** Ph.D. students are required to complete 15 credit hours in measurement, research and evaluation. These courses include: EPSY

5605, 5607, and 6601. In addition, doctoral students are required to take EPSY 5510.

**Dissertation.** Ph.D. students must complete a comprehensive examination, prepare a dissertation proposal, and then conduct, write, and defend their dissertation research.

**Master of Arts in Educational Technology**

The Master's degree with an area of concentration in Educational Technology features the "two summers M.A." online option and campus-based programs. For those students who already hold a Master's degree, they may apply to the Sixth-Year Diploma program which requires 30 credits beyond the Master's degree. The graduate program in Educational Technology prepares educators to put theory into practice in service to the wise integration of technology in formal and informal learning environments.

**Master of Arts in Educational Technology Requirements.** The M.A. in Educational Technology requires 30 credits. For the "two summers" online option, students work in a cohort program to complete their degree by following the program requirements. For on-campus students, two different options exist: a thesis (Plan A) or non-thesis (Plan B) option related to a student's graduate plan of study designed in concert with a major advisor. For Plan A, students complete a reduced plan of coursework (21 credit hours) followed by nine credits of Master's thesis research (GRAD 5950 or 5960) and defense of a research-based thesis. Plan B, the non-thesis option, requires a 30 credit plan of coursework, followed by a successful completion of a comprehensive examination. In general, the thesis option is preferred, especially if the student intends to complete doctoral degree requirements. The list below presents courses often included in the plan of studies for the Master's degree program.

**"Two Summers" Master of Arts Courses:** EPSY 5198, 5215, 5220, 5225, 5235, 5245, 5339, 5510, 5520, 5601.

**On-Campus Master of Arts Suggested Courses:** EPSY 5220, 5510, 5515, 5520, 5530, 5601, 5602, 5605, 5607.

**Giftedness, Creativity, and Talent Development M.A. and Ph.D.**

There are two graduate degrees in Educational Psychology with an area of concentration in Giftedness, Creativity, and Talent Development: the Master of Arts (M.A.) and Doctor of Philosophy (Ph.D.). The M.A. program prepares individuals for specialization in teaching in gifted and talented programs, as well as for leadership roles in creativity and gifted education as program coordinators, curriculum development specialists, and regional or state gifted education agency directors. The program of study includes coursework on strategies and program models for developing student talent and field experiences in school settings. The Ph.D. program is intended for persons who wish to become researchers, state department consultants, authors, university professors, and other types of leaders in the fields of gifted education, creativity, and talent development. Specific course requirements for the M.A. and Ph.D. programs in this area of concentration include those listed below as well as requirements determined by the student's advisory committee consistent with the minimum requirements.

**Master of Arts in Giftedness, Creativity, and Talent Development.** The M.A. degree requires satisfactory completion of at least 30 credits maintaining at least a "B" average. The required courses include those listed below; the remaining credit hours come from elective courses approved by the student's major advisor.

**Required Courses:** EPSY 5092, 5194, 5601, 5710, 5720, 5750; at least one of the following, at the direction of the major advisor, EPSY 5740, 6770.

**Required Examinations:** Students must complete required computer-based examinations near the completion of their required coursework. Passing scores on the examinations are required for degree completion.

**Doctor of Philosophy in Giftedness, Creativity, and Talent Development.** The Ph.D. program includes requirements for coursework, examination, and research as outlined below. It does not have a related area or foreign language requirement, unless one is specified by the advisory committee. Some courses below may be waived based on prior graduate course experience, as documented through program faculty review of the student's transcript.

**Required Courses:** EPSY 5510, 5605, 5607, 5621, 5710, 5720, 5850, 6601, 6770; at least 15 credits of GRAD 6950.

**Seminar Requirements.** Students are required to complete at least four semesters of EPSY 6194.

**Additional Credit Requirements.** Students are required to complete at least six additional credits of coursework specifically linked to gifted education or creativity content, as approved by the major advisor. These credits may include independent study.

**Required Examinations.** Ph.D. students are required to complete three components for their comprehensive examination: students must pass the M.A. level content examination within two attempts (unless previously passed as part of an M.A. degree); students must pass a program-required statistics examination within two attempts; and students must prepare a portfolio and sit for an oral examination with program faculty addressing how their portfolio demonstrates competence in the field and coherence toward further positions. Students must pass the oral examination within two attempts.

**Dissertation Proposal.** Students must submit a dissertation proposal and defend it before their advisory committee and readers. Students must complete all other dissertation requirements as specified by the Educational Psychology Department and the Graduate School.

### **Research Methods, Measurement, and Evaluation M.A. and Ph.D.**

The Department of Educational Psychology offers two graduate degrees with a concentration in the area of Research Methods, Measurement, and Evaluation (RMME): The Master of Arts (M.A.) and the Doctor of Philosophy (Ph.D.). The M.A. program is designed for practitioners who wish to acquire foundational skills and knowledge in the areas of measurement and assessment, program evaluation, and quantitative research methodology. Some students who earn an M.A. continue into the Ph.D. program. The Ph.D. program is designed for individuals who wish to pursue applied, research, or teaching careers in educational measurement and assessment, program evaluation, or quantitative research methods. In addition to completing the required coursework described below, Ph.D. students are strongly encouraged to seek out research experiences through participation in faculty research grants and projects at the University of Connecticut as well as through summer internships in government and industry agencies engaged in testing, education research, or other research that requires an RMME background.

**Master of Arts in Research Methods, Measurement, and Evaluation.** Students must complete a minimum of 30 credits while maintaining a GPA of 3.0 or higher across core courses and earn a grade of "B" or better in every core course. M.A. students may choose to earn the degree either under Plan A (thesis) or Plan B (exam). Students who choose Plan A must complete at least 21 credits of required coursework, nine credits of Master's thesis research (GRAD 5950 or 5960), and complete a thesis under the direction of their major advisor. An oral defense of the thesis is required. The thesis is graded pass/fail by the student's advisory committee. Students may not defend the thesis until all required coursework is satisfactorily completed. Students who choose Plan B must complete at least 30 credits of required coursework and pass a comprehensive exam containing questions related to content covered in the core courses listed below. The student's advisor may require oral defense of the exam. The passing grade on the exam is 70%. Students who fail the exam can retake the exam once. Students may not take the exam until all required coursework is satisfactorily completed.

**Required Courses:** EPSY 5510, 5601, 5602, 5605, 5607, 5621, 6601, 6621, totaling 21 credits. Content in all courses except EPSY 5510 is tested in the M.A. comprehensive exam.

**Additional Coursework for Plan B.** Students must choose from the following courses or alternative courses that are approved by the student's major advisor, for an additional nine credits: EDCI 6000; EPSY 5610, 6623, 6637; EPSY 6601 if EPSY 5601 is taken; EPSY 6636, 6651, 6494.

**Doctor of Philosophy in Research Methods, Measurement, and Evaluation.** In addition to the Graduate School requirements, Ph.D. students must complete coursework requirements as described below and pass both a preliminary exam after completing a prescribed set of courses generally taken in the first full year of study and a general exam taken after all core courses are completed. Students also undergo an annual review at

the end of each academic year. A minimum of 54 credits of coursework and three to six credits of independent study, internship or practicum credits is required for the Ph.D. If a student has already taken required courses at another University or as part of another degree program at the University of Connecticut, the requirement to complete 54 credits can be decreased if the major advisor and the advisory committee agree to the reduction or substitutions. However, all Ph.D. students in Research Methods, Measurement, and Evaluation (RMME) must complete at least 48 credits of doctoral coursework at the University of Connecticut. Ultimately, the student's major advisor, in consultation with their advisory committee and the RMME program faculty, determine the degree requirements for each Ph.D. student. Students must maintain a minimum GPA of 3.5 in core courses and earn a grade of "B" or higher in every core course. A student who receives a grade lower than a "B" (including "B-") will be required to repeat the course. Students who receive two or more grades of "C" or lower in a required course or a grade of "D" or lower in any courses may be asked to leave the program. Ph.D. students must show competency in EPSY 5601, 5605, and 5607, either by having previously taken the course or an equivalent, or by taking a competency exam. However, these courses do not count toward Ph.D. credits.

**Required Core Courses:** EPSY 5510\*, 5602, 5610, 5613, 5621, 6601, 6611, 6615, 6619, 6621, 6623, 6636, 6637, 6638, 6639\*\*, 6651, and 6655 totaling 51 credits.

\* This requirement may be waived for students who have taken a graduate-level Educational Psychology or Learning course from another university and earned a grade of "B" or better.

\*\* A suitable alternative course may be substituted, as approved by the student's major advisor.

**Additional Requirements.** Students complete an additional nine credits for the Ph.D. degree. Students must complete three to six credits from the following elective courses or an alternative elective course that is approved by the student's advisory committee: EDCI 6000; EPSY 6103; EPSY 6194 in any topical area; HDFS 5005; PP 5379. Students must complete three to six credits of independent study or practicum/internship. The following courses fulfill the independent study/practicum/internship credits: EPSY 5199 or 6494. Students who complete only three credits of additional coursework must complete at least six credits of independent study or practicum/internship. Students who complete six credits of additional coursework must complete at least three credits of independent study or practicum/internship. Internships may be academic year or summer experiences.

**1st Year Preliminary Exam.** The 1<sup>st</sup> year exam is taken after completing the sequence of "first year" and prerequisite courses within the RMME program and must be taken after completion of 15 credits.

**General Examination.** Ph.D. students must complete the following courses prior to taking the comprehensive exam: EPSY 5602, 5610, 5613, 5621, 6601, 6651, 6655, 6621, 6623, 6611, 6615, 6619, 6636, 6637, and 6638. The RMME program comprehensive examination must be taken within one calendar year of completing all of the required coursework. Further, the comprehensive examination must be passed in its entirety within five years of the beginning of the student's matriculation in the degree program. Students may not take the general examination before the plan of study has been filed with the graduate school.

### **School Psychology M.A. and Ph.D.**

There are two programs in School Psychology a Master of Arts (M.A.) degree, typically combined with a Sixth-Year Diploma in School Psychology, and a Doctor of Philosophy (Ph.D.) program.

**Master of Arts in School Psychology.** The combined Master's/Sixth-Year Diploma program is designed to prepare qualified school psychologists to practice in public schools or related educational settings. It is accredited by the Connecticut State Board of Education and is approved by the National Association of School Psychologists and the National Council for Accreditation of Teacher Education (NCATE). For certification, students must complete both the requirements for the Master's degree described below, as well as the additional requirements for the Sixth-Year Diploma in School Psychology (described separately under Sixth-Year Diploma programs). The combined program requires a minimum of 75 semester hours of graduate coursework (including the practica and internship completed under the Sixth-Year Diploma). The Master's degree is awarded after 30 semester hours of coursework. The Sixth-Year diploma is awarded

after successful completion of the remaining semester hours of coursework and the practica and internship. The program is designed so that students can complete all Master's/Sixth-Year program requirements in three years of full-time graduate study.

**Required Courses:** EPSY 5092 practicum, three semester hours per semester, for two semesters, for a total of six semester hours during the M.A. degree; EPSY 5340, 5403, 5404, 5420, 5510, 5602, 5605, 6469, and 6601.

The Ph.D. program in school psychology adheres to the scientist-practitioner model of graduate education in psychology, and prepares psychologists who work in education and/or health related settings in a variety of practice, teaching, and/or research roles. The program is accredited by the American Psychological Association and as such complies with the guidelines and principles for accreditation of programs in health service psychology as outlined by the American Psychological Association. The program is designed to be five academic years of full-time study; students typically take five to six years from the baccalaureate degree to complete all doctoral requirements. The program requires a minimum of 120 semester hours of coursework beyond the baccalaureate degree including the practica and internship (1500-hours), and 15 hours of dissertation research. To obtain a doctoral degree, the student must be enrolled full-time in the University of Connecticut program for at least three years, even if they already have a Master of Arts/Sixth-Year Diploma.

**Dissertation Proposal-General Examination.** All dissertation research must be directed by a member of the core faculty as the major advisor. Preparation and acceptance of the dissertation proposal should follow current Department and University guidelines. The student must orally present and defend the proposal to the advisory committee.

**Final Examination.** After being admitted to candidacy for the Ph.D. degree and completing the dissertation, a student must pass the final oral examination or dissertation defense. The decision regarding the student's performance rests solely with the advisory committee.

**Required Courses:** In addition to the courses required for the Master of Arts degree/Sixth-Year Diploma listed above, all Ph.D. students must also satisfactorily complete the following courses: EPSY 5318, 5455, 5607, 5610, 6194; EPSY 6494 for a total of 24 semester hours across eight semesters; EPSY 6491 for a total of six to twelve semester hours; GRAD 6950 for at least 15 credits in the plan of study; PSYC 5140; PSYC 5570 or 6750.

#### **Required Assessments for M.A. and Ph.D. Students**

**Portfolios.** The portfolio requirements and review process are described in detail in pre-internship and internship portfolio manuals. The pre-internship portfolio consists of work samples completed throughout the program in coursework and practica, professional documents, practicum and self-evaluations, and other relevant program-related documents.

**Examinations.** Students must pass the Master's examination prior to being awarded the Master's degree. The examination occurs near the end of the student's first year and after the student's plan of study has been approved by the Executive Committee of the Graduate School. The Master's examination is constructed under the jurisdiction of the school psychology faculty and other Departmental faculty who were involved in the student's first year of course instruction.

**The Praxis Series.** The Praxis Series - School Psychologist (code 5402) is administered by the Educational Testing Service. Students take the examination after admission to the Sixth-Year program; after completing approximately 42 hours of their coursework in the Master's/Sixth-Year program; and prior to beginning their internship. The standardized examination provides an assessment of content in concert with national standards, and allows for the evaluation of our students relative to a nationwide reference group.

**Clinical Requirements for M.A. and Ph.D. Students.** M.A. and Ph.D. students must complete the following clinical requirements.

**Practica Requirements.** The practica sequence was developed in accordance with American Psychological Association (APA) and National Association of School Psychologists (NASP) guidelines that require planned supervised experiences that include direct service and formally scheduled supervision. The field experiences are coordinated with coursework to allow students ample opportunity to combine their theoretical and practical knowledge in a supervised situation. Practicum experiences in a school or related educational setting are a required component of program completion and graduation. Students should refer to the "Program Handbook" and "Practica Syllabus" for information on practica hour requirements.

**Internship Requirements.** The internship in school psychology complies with APA and NASP standards. The internship is designed to enhance the development of competencies and professionalism and to be the culminating experience in the student's program. The full description of the internship requirements is outlined in the document entitled "School Psychology Program Internship Manual." To be eligible for internship, the student must have met all the following requirements prior to signing any contract or internship agreement with an internship site: completed all required coursework with no remaining incomplete courses; passed the Master's Degree Qualifying Examination; completed all practica requirements; passed the Praxis-School Psychology Examination; passed the Pre-Internship Portfolio; for doctoral students, successfully defended their dissertation proposals.

#### **Special Education M.A. and Ph.D.**

The Program in the Department of Educational Psychology (EPSY) offers two graduate degrees with an area of concentration in Special Education: a Master of Arts (M.A.) and the Doctor of Philosophy (Ph.D.). In addition, the Department of Educational Psychology offers a Sixth-Year Diploma (SYD). The Master's program is designed for a broad range of professionals (e.g., general or special education teachers, graduates in related fields) to provide in-depth learning and experiences related to supporting children and adults with disabilities and at risk for learning and behavioral difficulties. This program provides advanced study in three areas: Literacy Supports for Students at Risk for Learning Difficulties; School-wide Positive Behavior Supports (SWPBS); and Transition and Postsecondary Supports. Students also may design an individualized plan of study with the approval of their advisor. The Doctoral Program is designed to enhance independent thinking and leadership qualities through an individualized program embedded in a thorough knowledge of theory and the existing literature and culminating in active research to guide, direct, and inform the field. It is designed to prepare professionals for leadership positions in research, scholarship, university teaching, and service.

**Master of Arts Required Courses:** EPSY 5092 for three to six credits; EPSY 5119, 5121; EPSY 5601 or equivalent, totaling 30 credits.

**Doctor of Philosophy Requirements:** Students complete EPSY 5510; four doctoral seminars (EPSY 6194); EPSY 5605, 5607, 6601; 15 credits of GRAD 6950. Doctoral students also identify an area of emphasis which provides an opportunity to develop expertise in a specialty area such as Literacy Supports for Students at Risk for Learning Difficulties, School-wide Positive Behavior Supports (SWPBS), or Transition and Postsecondary Supports.

#### **Higher Education and Student Affairs (M.A.)**

The Master of Arts in Higher Education and Student Affairs (HESA) is designed to prepare students for professional careers in various higher education and student affairs positions. This full-time, two-year, cohort-based academic program combines traditional instruction with graduate assistantships and practicum experience. Students complete a total of 44 credit hours for the HESA degree program, which includes a variety of elective graduate courses offered through the Department of Educational Leadership and other academic departments.

**1st Semester Required Courses:** EDLR 5102, 5105, 5122, 5092.

**2nd Semester Required Courses:** EDLR 5092, 5103, 5117, 5119.

**3rd Semester Required Courses:** EDLR 5092, 5108, 5126.

**4th Semester Required Courses:** EDLR 5107, and 5118. Students must take an additional six credits of electives and successfully complete and pass the summative exam, which consists of an oral presentation in which students address learning related to two HESA core competencies and application of knowledge to student affairs practice.

## Learning, Leadership and Education Policy (Ph.D.)

The Learning, Leadership, and Education Policy Doctor of Philosophy (Ph.D.) program offers three concentrations: Adult Learning, Leadership and Policy, and Sport Management. These three concentration areas provide Ph.D. students with the opportunity to link their professional and academic goals to scholarship, faculty resources, and curriculum that are designed to meet their interests in adult learning, educational leadership, education policy, and sport management. With one concentration primarily focusing on learning theory, one on theories of policy and leadership, and one on management theories students can maintain distinct academic identities while simultaneously applying lenses of social justice and organizational change to their work in and with complex organizations. The Ph.D. program is foremost a research degree designed for those who aspire to conduct and critically apply research in their careers. Students pursuing this degree take on roles as faculty members, researchers, government employees, policy scholars, or organizational leaders.

**Adult Learning Requirements.** The Adult Learning Concentration Plan of Study includes 18 credits of core coursework, 12 or more credits in area of concentration and electives, nine or more credits in research design and methods, 15 credits of Doctoral Dissertation credits, completion of a general examination, completion of a successful defense of the dissertation proposal, and successful dissertation defense. See the [lep.education.uconn.edu/adult-learning-concentration](http://lep.education.uconn.edu/adult-learning-concentration) website for a sample plan of study.

**Leadership and Policy Requirements.** The Leadership and Education Policy concentration Plan of Study includes 15 credits of core coursework, 12 or more credits in the concentration, nine or more credits in research design and methods, 15 credits of Doctoral Dissertation preparation credits, completion of a comprehensive examination and successful dissertation defense. See the [lep.education.uconn.edu/lep-concentration](http://lep.education.uconn.edu/lep-concentration) website for a sample plan of study.

**Sport Management Requirements.** The Sport Management concentration Plan of Study includes 15 credits of core coursework, nine credits in the concentration, nine or more credits in research design and methods, nine or more credits in a cognate area, 15 credits of Doctoral Dissertation preparation credits, completion of general exams and successful dissertation defense. See the [lep.education.uconn.edu/sport-management-concentration](http://lep.education.uconn.edu/sport-management-concentration) website for a sample plan of study.

## Sport Management (M.S.)

The Master of Science (M.S.) in Sport Management prepares students in the theoretical, research, and applied dimensions of this field of study. The M.S. degree requires students to select a thesis, capstone project or internship option. Students selecting to do a thesis must complete 24 credit hours (eight courses) of coursework and nine credit hours of thesis research. Students selecting the internship or capstone project options must complete 27 credit hours (nine courses), a comprehensive exam and a six credit internship or capstone project following the completion of all coursework.

**Required Courses:** Six to nine hours of Research and Statistics taking EPSY 5601 and 5605. (Additional research courses recommended only for students selecting the thesis option. These credit hours could count as electives). EDCI 6000 or EPSY 5607.

**Sport Management Major Courses:** EDLR 5300, 5315, 5325, 5380, 5385, totaling 15 credits.

**Electives.** Students earn six credits of two 5000 level or above courses, taken from outside the Sport Management Major courses, to be discussed with major advisor. EDLR 5518 may be taken as an elective.

**Capstone Option One (Non-Thesis Option):** EDLR 5091, Internship, for six credits, or EDLR 5085, Research Project, for six credits.

**Capstone Option Two (Thesis Option):** GRAD 5950, Thesis Research, for nine credits.

# Office of Global Affairs

## International Studies (M.A.)

The Master of Arts (M.A.) in International Studies with a concentration in Latino and Latin American studies is administered by El Instituto. In this program, students engage in interdisciplinary study and research related to Latina/o, Caribbean, and Latin American worlds and can focus their studies in one of three broad areas: U.S. Latina/o Studies, Latin American and Caribbean Studies, and Comparative Transnational Latin(o) American Studies. The core faculty in the program hold joint appointments between El Instituto and seven other academic departments. El Instituto is also supported by over 70 affiliated research faculty and scholars across disciplines and departments throughout the university. El Instituto's courses and faculty research examine a wide array of local, hemispheric, and global dimensions of the Latina/o, Caribbean, and/or Latin American condition. Graduates go on to work in education, administration, cultural, business, government, and not-for-profit organizations. Many go on to pursue a Ph.D. and other advanced degrees.

**Requirements:** At least 30 credits maintaining at least a "B" average. The required courses for the M.A. degree are LLAS 5000, 5100, and 5890 (Thesis Writing, last semester of study). Another course in methodology might be substituted for either LLAS 5000 or 5100 if necessary, with the approval of El Instituto's Director or Associate Director. Students are required to focus their studies in a core discipline (e.g. Anthropology, Economics, Sociology, Spanish) and take at least one methodology course in that discipline. They must also take courses in two additional disciplines. Students will prepare an M.A. paper or comparable project during their final semester with guidance from a faculty advisor of their choosing. Students who focus in Latin America must pass a language proficiency examination if they are not native speakers.

# UConn Health

## Biomedical Science (M.S., Ph.D.)

The Biomedical Science program offers two graduate degrees: Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). The areas of concentration within these degree programs are the following: Cell Analysis and Modeling, Cell Biology, Genetics and Developmental Biology, Immunology, Molecular Biology and Biochemistry, Neuroscience, and Skeletal Biology and Regeneration. The M.S. in Biomedical Science may be either a coursework-based degree or a research-based degree. The Ph.D. in Biomedical Science prepares students for research careers in academia and industry. Graduates also enter careers in teaching, consulting, non-profit organizations, private foundations and government.

**Requirements:** The M.S. and Ph.D. requirements in Biomedical Science conform to the Graduate School requirements as outlined in the Academic Regulations section of this catalog. Specific course requirements for the M.S. and Ph.D. in Biomedical Science are determined by the student's advisory committee consistent with the minimum requirements of the Graduate School. The Ph.D. in Biomedical Science does not have a related area or foreign language requirement. All students in the M.S. and Ph.D. programs must take MEDS 5310, Responsible Conduct in Research, unless the student's advisory committee approves an equivalent course or training experience.

## Clinical and Translational Research (M.S.)

The Master of Science (M.S.) degree program in Clinical and Translational Research (MCTR) is administered by the Connecticut Institute for Clinical and Translational Science (CICATS) at the University of Connecticut. The program, which stresses clinical research methods and a research practicum, is offered to individuals with a health-related terminal degree (for example, M.D., Ph.D., Pharm.D., D.D.S., or D.M.D.) to provide practical research training in preparation for independent research. Due to course sequencing, students are typically admitted for the Fall semester. All work must be completed within four years from the beginning of study, which is defined as the beginning date of the earliest course, wherever taken, listed on the approved Master's Plan of Study. The three core courses in clinical and translational research are generally taken consecutively; therefore, the minimum timeframe to complete the program is 18 months. Students must submit a Plan of Study no later than the beginning of their final semester before degree completion. The MCTR program is a Plan B (non-thesis) program. Students are required to complete a final examination, which entails the oral defense of a grant application and a manuscript. Final examination materials (grant application and manuscript) must be submitted to the MCTR Administrative Office at least three weeks prior to the student's final exam.

**Requirements:** The M.S. program in Clinical and Translational Research requires a minimum of 30 credits. The credits include: nine credits of core course work, 12 research practicum credits and nine credits of elective course work approved by the MCTR Executive Committee. Students may also take an independent study (CLTR 5099) in place of an elective.

**Core Courses:** CLTR 5020, 5357, and 5359.

**Research Practicum:** CLTR 5407 for 12 credits.

**Elective Courses:** A total of nine elective credits are required. Students will choose from a list of approved courses including, but not limited to CLTR 5360, which students are encouraged to enroll in. In the subsequent semester, students have the option to enroll in a three-credit independent study to write a publishable manuscript with their academic mentor. Examples of approved electives include: MEDS 5308, 5310, 6447; PUBH 5404, 5405, 5409, 5436, 5475, 5501, 5504. Students may request permission from the MCTR Executive Committee to enroll in an elective that is not on the list of approved courses.

## Dental Science (M.Dent.Sc.)

The Graduate School, in collaboration with the School of Dental Medicine, offers one graduate degree in Dental Science: the Master of Dental Science (M.Dent.Sc.). The M.Dent.Sc. degree program is an interdepartmental program whose primary objective is to provide instruction in dental science

that enhances the student's scholarly ability to instruct and undertake research, and may serve as preparation for careers in dental academia. The M.Dent.Sc. degree program is offered to individuals who are concurrently pursuing advanced dental education in one of the residency certificate programs offered by the School of Dental Medicine.

**Requirements:** In addition to the Graduate School requirements outlined in the Academic Regulations section of this catalog, the M.Dent.Sc. program requires completion of a minimum of 30 credits with an overall GPA of 3.0. Nine of the 30 credits should be designated as Master's Thesis Research credits, GRAD 5950 or 5960. Six of the 30 credits may be accumulated through the candidate's clinical certificate program. The remaining 15 credits must be fulfilled through the completion of other graduate level coursework, including up to six credits of Independent Study, DENT 5495. A major component of the minimum of 30 credits of course work must be related to the student's specific research area, which is accomplished by a formal review and approval of the student's plan of study by their Advisory Committee. M.Dent.Sc. students may enroll for a maximum of nine graduate credits per semester. In addition to the minimum number of course credits required for the degree, a candidate's respective Advisory Committee may require the student to take additional coursework in consideration of the student's objectives and previous preparation.

## Genetic Counseling (M.S.)\*

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, and UConn Health.*

The UConn Department of Allied Health Sciences under the umbrella of the College of Agriculture, Health and Natural Resources and the Institute for Systems Genomics offers a Master's Degree in Genetic Counseling. This degree program provides innovative and interprofessional training for tomorrow's leaders in the translation of genomics and precision medicine. With the availability of NextGenCT training facilities on the UConn campuses, students will learn the technological advances they will later need to understand and interpret for their patients and communities. Skills development in scientific communication, ethical considerations, clinical applications, literature appraisal, and leadership assures graduates are effective, productive, and compassionate professionals. The Program is not offered on a part-time basis and includes required summer components. Courses and training take place on the Storrs and Farmington campus and online. Practical training requires travel to external affiliated hospitals, centers, and clinics across Connecticut. Transportation may be available in some instances.

**Requirements for M.S. in Genetic Counseling:** Except in special cases, genetic counseling students will complete required coursework and clinical rotations within 24 months. The successful graduate student will have established a three-faculty member Advisory Committee and completed the requisite total number of academic credits predetermined by program administration, inclusive of course work, laboratory training, professional development, clinical rotations, and a capstone project as outlined in a plan of study. In addition, M.S. in Genetic Counseling candidates will have accumulated sufficient logbook cases for the American Board of Genetic Counseling examination eligibility. Specific course requirements are determined by both program leadership and the student's advisory committee consistent with requirements specified by the Graduate School. The typical plan of study includes conceptual coursework, laboratory training, professional development, and practical coursework (clinical rotation experience). Didactic and practical courses are predetermined by program administration. Electives may be selected from a menu of options in consultation with the students' academic advisor and advisory committee. The plan of study has been designed based on domains needed to gain mastery in the body of knowledge of the field of Genetic Counseling. Coursework is selected to assure students can apply knowledge of genetic principles and genomic technologies to improve quality of health-care through the diagnosis, screening, intervention or prevention of disease and the maintenance of health. The exit exam timing and format are determined and designed by the Advisory Committee to reinforce the discipline-specific competency and provide an evaluation tool for relevant problem-solving abilities.

The Genetic Counseling curriculum meets the Accreditation Council for Genetic Counseling (ACGC) requirements in that student training supports

the 22 practice-based competencies within four domains: Genetics Expertise and Analysis, Interpersonal, Psychosocial and Counseling Skills, Education, and Professional Development and Practice. A content component common to all health professions lies in both public health and the ethical, legal, social implications of genetics.

\* This program is not accepting applicants at this time.

## Materials Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science offers programs leading to Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in the area of Material Science. All programs include training in synthesis, characterization, and applications of materials, and give students sufficient flexibility to pursue their special interests as well as time to take courses in other departments at the University of Connecticut.

### Master of Science in Materials Science

The program normally requires 31 credits. While it is possible to complete the M.S. degree within a year, most students will need three to four semesters. The courses of the program cover courses concerning synthesis, characterization, and applications of materials. The plan of study for the M.S. degree may be formulated with related work in almost any area, e.g., Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. Students are encouraged to participate in research projects done by members of the department.

**Requirements:** There are no specific required courses. All students must choose a committee for the M.S. degree and that committee must approve all courses. Typical courses are any of the 5000 series courses in Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. The final requirement is passing the Master's Exam which has two parts. One is a written test concerning basic understanding of course materials. The second requirement is a final oral exam which includes course work, and any research done by the student. For a course work master's degree there is no thesis requirement. For a research based Master's degree, there is a requirement of a Master's thesis. All students are encouraged to follow the research degree route. In order to be considered for a possible switch to the Ph.D. program or for financial support, a student with an M.S. degree in Materials Science or someone showing great promise during the M.S. program needs to apply to the Ph.D. Program.

### Ph.D. Program in Material Science

Emphasizes development of the ability to generate novel research results in Materials Science. Individuals with a Bachelor's degree in any major, with an interest in Materials Science are encouraged to apply. The course work typically consists of at least 16 graduate level courses that cover a wide range of topics, including Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. After completing the necessary course work and a sequence of examinations, a Ph.D. candidate must complete a dissertation that makes an original contribution to the field of Materials Science.

**Requirements:** For students entering the program after a Bachelor's Degree, typically 16 to 18 courses are required. An individual plan of study is developed by the student and their Advisory Committee. Courses in the following departments are considered: Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. In general, Ph.D. students must take graduate level courses that are approved by the major advisor of a student, as well as the student's advisory committee. The materials science program has no requirement on foreign languages.

The first formal requirement for the Ph.D. degree is passing the General Examination. The general examination consists of a written exam which is an original proposal. If the student passes the written exam, they are

then asked to prepare for an oral examination. The oral exam consists of any aspect of course work, the written exam questions, and the proposal, research progress, or combinations of these. The preparation of a dissertation then follows, where the student must present an original contribution to the general area of Material Science. The final requirement is a defense of the Ph.D. dissertation before the Ph.D. Advisory Committee, students and anyone else interested in attending. The exam consists of a presentation by the student, questions of the students and audience, and then a closed session of questions from the Advisory Committee.

## Polymer Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science Polymer Program serves as the sole center in the State of Connecticut for graduate research and education programs focusing on polymer science and engineering. The program is a nationally and internationally recognized center of excellence for interdisciplinary research and education in the fields of polymer science and engineering. The program is dedicated to meeting the educational needs of its graduate and professional students; providing lifelong learning opportunities in the study of polymeric materials; to assisting Connecticut industry in developing polymer technology; and to expanding and disseminating the global knowledge base regarding polymeric materials.

### Master of Science Program

Other than the GRE General Test scores, there are no special requirements for admission to the master's program beyond those of the Graduate School. Selection of Plan A (thesis) or Plan B (non-thesis) is made after consultation with the Advisory Committee. For Plan A, the student must successfully complete no fewer than 21 credit hours and no fewer than nine additional credits of Master's Thesis Research by taking GRAD 5950 or 5960, as well as the writing an oral defense of a thesis. For Plan B, the student must successfully complete no fewer than 30 credits of advanced course work and a comprehensive final examination, but no thesis is required.

### Doctor of Philosophy Program

Admission to the doctoral program is based upon a careful assessment of the student's potential for creative research in polymer science. There are no special requirements for the doctoral program beyond those of the Graduate School, other than the GRE General Test scores.

**Requirements:** No fewer than 30 credit hours of advanced coursework, including POLY 5352, 5380, 5381, 5382, 5384, 6001; GRAD 6950 for at least 15 additional credits of Doctoral Dissertation Research. The General Exam, which consists of two parts: a written portion and an oral portion. The written portion is a comprehensive cumulative four-part exam. The oral portion is the writing and oral defense of a dissertation proposal. The Doctoral Dissertation, which consists of two parts: a written dissertation, and an oral defense of the dissertation before a committee of faculty and the general public.

## Public Health (M.P.H., Ph.D.)

The Department of Community Medicine and Health Care at UConn Health offers the Master of Public Health (M.P.H.) and Doctor of Philosophy (Ph.D.) degrees. The M.P.H. focuses on Interprofessional Public Health Practice; the Ph.D. degree focuses on the Social and Behavioral Determinants of Health. The M.P.H. degree integrates coursework on foundational topics in public health and experiential requirements that demonstrate competency as a public health practitioner with elective options on substantive areas of study (e.g., epidemiology, behavioral science, health systems administration, etc.). It is oriented to students seeking practice-based careers in governmental service, non-governmental agencies, and health care organizations.

**Requirements:** The M.P.H. and Ph.D. degree requirements conform to all the Graduate School requirements, as well as standards specified by the Council on Education for Public Health (CEPH), an independent agency recognized by the U.S. Department of Education to accredit public health schools and programs.

**Master of Public Health (M.P.H.)**

The M.P.H. degree requires completion of 48 graduate credits comprised of 24 required credits on foundational topics in Public Health, a three credit practicum, and 12-18 credits for elective course content. Specific electives are determined by the student's advisory committee. An Integrative Learning Experience is required of all students, consisting of either a three credit capstone project or a nine credit academic thesis. A student must maintain a cumulative grade point average (GPA) of 3.0 in required courses with no grade below a "B-."

**Required courses:** PUBH 5403, 5404, 5405, 5406, 5407, 5408, 5409, 5431.

**Substantive Area of Focus.** Students are required to complete six to eight courses reflecting a substantive concentration in a public health subject area (e.g., Epidemiology and Biostatistics, Health Administration and Policy, Environmental/Occupational Health, Health Promotion/Disease Prevention, etc.). Elective coursework must be selected in consultation with program advisors.

**Doctorate in Public Health (Ph.D.)**

This program rigorously prepares public health professionals, scholars, and research scientists needed in a wide variety of settings to meet the health challenges of the 21st century. The degree reinforces foundational principles of public health with theoretical underpinnings and methodological techniques of population health research. The Ph.D. degree requires completion of 60 credits beyond the Master's degree, consisting of 45 (15 courses) in coursework and 15 credits of Doctoral Dissertation Research. Options for focused work in Public Health are many, although the areas of research listed below are emphasized.

**Social and Behavioral Health Sciences.** Explores interpersonal and institutional influences on individual and community health, with attention to design and evaluate of interventions for improving health outcomes.

**Occupational Health Sciences.** Offers students grounding in theory and methodology as well as specialized instruction that builds knowledge of the broad range of occupational exposures and their influences on health, illness and injury, and interventions to improve these outcomes.

**Chronic Disease Epidemiology.** Develops expertise in cancer epidemiology and prognosis, public health genetics, and psychiatric epidemiology. A student must maintain a cumulative grade point average (GPA) of 3.0 in foundational knowledge courses with no grade below a "B-."

**Foundational Knowledge:** PUBH 5406 or 5461; 5434 or an advanced statistical elective; 5497 when taken as Intermediate Epidemiology or an advanced epidemiology elective; 5497 when taken as Chronic Disease Control and Prevention; and 6490 (three one-credit seminars: Introduction to the Research Process, Introduction to Public Health Practice, and Mentored Public Health Teaching).

**Population Research Methods:** PUBH 5435, 5437, 5497 as Principles of Risk Communication, and PP 5379, totaling 12 credits.

**Biostatistics Electives.** With permission of advisory committee.

**Epidemiology Electives.** With permission of advisory committee.

**Doctoral Dissertation Research:** 15 credits of GRAD 6950 or 6960.

**Systems Genomics (Ph.D.)**

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, and UConn Health.*

The Institute for Systems Genomics offers a Doctor of Philosophy (Ph.D.) in Systems Genomics.\* A Ph.D. in Systems Genomics trains students to take leadership roles in basic research, clinical research, program management and consultation at the Ph.D. level in the areas of Genome Sciences and Personalized Genomic Medicine. Systems Genomics students will receive specialized training in one or more of the areas listed below.

**Integrated Life Sciences.** Mechanisms of inheritance; genetics and genomics of human disease; stem cell biology; molecular biology including genomic technology; neurobiology and behavioral genetics and genomics.

**Integrated Mathematics, Statistics and Computer Science.** Computational methods in systems biology; bioinformatics analysis of high-throughput data; such as Next-Generation Sequencing (NGS) or mass

spectrometry data; facility with data bases relevant to systems genomics and network biology.

**Integrated Personalized Health Care and Ethical, Legal and Social Implications (ELSI).** Interdisciplinary competency in human genomic diagnostics, laboratory diagnostics, health care ethics, and regulatory issues in the clinical laboratory.

**Requirements for Ph.D. in Systems Genomics**

Except in special cases, Ph.D. candidates will complete required coursework within the first two years of enrollment in the program. The first year of coursework will focus on "Foundations of Systems Genomics." The second year will focus on "Advanced Topics in Systems Genomics." Specific course requirements are determined by the student's Advisory Committee consistent with the minimum requirements specified by the Graduate School. The Ph.D. in Systems Genomics does not have a related area or foreign language requirement, unless one is specified by the Advisory Committee.

\* This program is not accepting new applicants at this time.

# School of Nursing

## Nursing (D.N.P., M.S., Ph.D.)

The School of Nursing offers study leading to the Master of Science (M.S.), Doctor of Nursing Practice (D.N.P.), and Doctor of Philosophy (Ph.D.) degrees in nursing.

### Master of Science Requirements

The purpose of the Master's program is to prepare nurses for advanced practice with specialized knowledge, skills, and values. Graduates assume leadership roles in the health care system and the discipline of nursing by applying existing knowledge and using a spirit of inquiry to examine and test knowledge. Areas of Concentration include the following: Adult-Gerontology Acute Care Nurse Practitioner, Adult-Gerontology Primary Care Nurse Practitioner, Family Nurse Practitioner, and Neonatal Nurse Practitioner. The Commission on Collegiate Nursing Education accredits the program. The plan of study includes nursing and related courses according to the requirements for each area of concentration. Part-time and/or full-time plans of study are available. Each student completes a core curriculum in theory, research, statistics, legal, regulatory and policy aspects of advanced nursing practice. Additional courses in the areas of concentration are also required. A minimum of 2,080 hours of clinical experience as a Registered Nurse (RN) providing direct patient care is required prior to enrolling in NURS 5062 or 5362. For those candidates in the Neonatal Practitioner Program, all 2,080 hours must be from an RN neonatal clinical experience.

**Accelerated Master of Science Requirements.** An Accelerated Master of Science (M.S.) program is available for nurses with diplomas, associate degrees, or baccalaureate degrees in another field. No student may take more than 25% of course credits required for the master's degree as a non-matriculated student. No student may transfer in more than 25% of course credits required for the master's degree plan of study. The M.S. program requires a cumulative grade point average of 3.0 or above to earn the Master of Science degree in Nursing. Students must earn a "B" or better in all graduate courses with a NURS prefix in order to earn credit toward graduation. A student may only repeat one course with a NURS prefix throughout their graduate study. If a student does not earn a "C+" or better on the first try, a collaborative decision between the advisor and the student will determine if a repeat of the course is appropriate.

**Required Core Courses:** NURS 5012, 5020, 5030, 5060, 5811, 5870.

**Adult Gerontology Acute Care Nurse Practitioner Track:** NURS 5150, 5160, 5169, 5170, 5179, 5400, 5409.

**Adult Gerontology Primary Care Nurse Practitioner Track:** NURS 5150, 5400, 5409, 5410, 5419, 5420, 5429.

**Family Nurse Practitioner Track:** NURS 5150, 5400, 5409, 5410, 5420, 5430, 5449.

**Neonatal Nurse Practitioner Track:** NURS 5350, 5362, 5365, 5369, 5370, 5375, 5379, 5385, 5389.

A final examination is required for graduation and is embedded in coursework for the respective tracks except for Neonatal Nurse Practitioner, which requires an intensive immersion simulation based experience.

### Doctor of Nursing Practice Requirements

The Doctor of Nursing Practice (D.N.P.) Program offers a terminal degree in nursing for those interested in an advanced nursing practice role. D.N.P. advanced practice nurses are prepared to assume leadership roles as providers and administrators in healthcare settings or as clinical faculty in educational settings. The D.N.P. program focuses on education in the scholarship of application and integration. This program has two entry/matriculation points: post-Bachelor's degree (B.S.-D.N.P.) and post-Master's degree entry for those already holding RN or APRN licensure and certification with Master of Science (M.S.) preparation. The B.S. - D.N.P. Program encompasses a Nurse Practitioner concentration leading to the conferral of an M.S. degree as part of the B.S.-D.N.P. Program. This option allows students to begin advanced practice while continuing their doctoral studies. Advanced practice options available include the Adult Gerontology Acute Care Nurse Practitioner, Adult Gerontology Primary Care, Family Nurse Practitioner, or the Neonatal Acute Care Nurse Practitioner. The B.S.-D.N.P. Program options range in credits from 84-92 in total, dependent

on area of concentration, as well as a D.N.P. Project and evidence of a minimum of 1,000 supervised clinical hours. The Post-M.S. Program of Study requires a minimum of 30 credits, a D.N.P. Project, and evidence of a minimum of 1,000 supervised clinical hours post-baccalaureate. A scholarly portfolio, a general exam and a D.N.P. project are required for graduation.

**Required Core Courses:** NURS 5845, 5850, 5855, 5860, 5865, 5869, 5870, 5879, 5885, 5889, 5895, and 5910.

**Optional Related Area Certificates.** Health Professions Education Graduate Certificate: NURS 5700, 5710, and 5720. Holistic Nursing Online Graduate Certificate: NURS 5001, 5002, and 5003. Pain Management Online Graduate Certificate: NURS 5101, 5102, 5103, and 5104.

### Doctor of Philosophy Requirements

The purpose of the Doctor of Philosophy (Ph.D.) Program is to prepare nurse leaders who will advance the scientific body of knowledge that is unique to professional nursing practice. Educational experiences offered in nursing theory development, philosophy of nursing science, qualitative and quantitative research methods, and in advanced statistics. Study in specialty areas further supports the individual's area of clinical interest. A general exam (publishable manuscript), a scholarly portfolio, and a dissertation (traditional five chapter or three manuscript based (excluding general exam) five chapters) are required for graduation.

**Required Core Courses:** GRAD 5910; 15 credits of GRAD 6950; NURS 6100, 6101, 6122, 6123, 6125, 6130, 6135, 6160, 6165, 6175; six credits in courses supportive of the dissertation area.

# School of Pharmacy

## Materials Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science offers programs leading to Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in the area of Material Science. All programs include training in synthesis, characterization, and applications of materials, and give students sufficient flexibility to pursue their special interests as well as time to take courses in other departments at the University of Connecticut.

### Master of Science in Materials Science

The program normally requires 31 credits. While it is possible to complete the M.S. degree within a year, most students will need three to four semesters. The courses of the program cover courses concerning synthesis, characterization, and applications of materials. The plan of study for the M.S. degree may be formulated with related work in almost any area, e.g., Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. Students are encouraged to participate in research projects done by members of the department.

**Requirements:** There are no specific required courses. All students must choose a committee for the M.S. degree and that committee must approve all courses. Typical courses are any of the 5000 series courses in Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. The final requirement is passing the Master's Exam which has two parts. One is a written test concerning basic understanding of course materials. The second requirement is a final oral exam which includes course work, and any research done by the student. For a course work master's degree there is no thesis requirement. For a research based Master's degree, there is a requirement of a Master's thesis. All students are encouraged to follow the research degree route. In order to be considered for a possible switch to the Ph.D. program or for financial support, a student with an M.S. degree in Materials Science or someone showing great promise during the M.S. program needs to apply to the Ph.D. Program.

### Ph.D. Program

Emphasizes development of the ability to generate novel research results in Materials Science. Individuals with a Bachelor's degree in any major, with an interest in Materials Science are encouraged to apply. The course work typically consists of at least 16 graduate level courses that cover a wide range of topics, including Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. After completing the necessary course work and a sequence of examinations, a Ph.D. candidate must complete a dissertation that makes an original contribution to the field of Materials Science.

**Requirements:** For students entering the program after a Bachelor's Degree, typically 16 to 18 courses are required. An individual plan of study is developed by the student and their Advisory Committee. Courses in the following departments are considered: Biology, Chemistry, Physics, Economics, Business, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering, Electrical engineering, and Materials Science and Engineering. In general, Ph.D. students must take graduate level courses that are approved by the major advisor of a student, as well as the student's advisory committee. The materials science program has no requirement on foreign languages. The first formal requirement for the Ph.D. degree is passing the General Examination. The general examination consists of a written exam which is an original proposal. If the student passes the written exam, they are then asked to prepare for an oral examination. The oral exam consists of any aspect of course work, the written exam questions, and the proposal, research progress, or combinations of these. The preparation of a dissertation then follows, where the student must present an original contribution to the general area of Material Science. The

final requirement is a defense of the Ph.D. dissertation before the Ph.D. Advisory Committee, students and anyone else interested in attending. The exam consists of a presentation by the student, questions of the students and audience, and then a closed session of questions from the Advisory Committee.

## Pharmaceutical Sciences (M.S., Ph.D.)

The School of Pharmacy's Program in Pharmaceutical Sciences offers graduate degrees in three areas of concentration: Medicinal Chemistry, Pharmacology/Toxicology, and Pharmaceutics.

**Medicinal Chemistry.** The Division of Medicinal Chemistry in the Department of Pharmaceutical Sciences offers a Ph.D. in Medicinal Chemistry. The Division also offers a Master of Science (M.S.) degree in Medicinal Chemistry; however, the Division does not admit students to the University for the specific purpose of earning an M.S. degree. The Ph.D. program in Medicinal Chemistry is focused on research and education in all areas of drug discovery and development. The program prepares students for a wide-range of careers in academics, industry, and government. The M.S. and Ph.D. degrees in Medicinal Chemistry require a defined set of core courses, related area courses, electives, and research as outlined below.

**M.S./Ph.D. Core Requirements:** GRAD 5910; PHAR 5297, 5301, 5302, 5303.

**Seminar Requirement:** Ph.D. students are required to enroll in PHAR 5393 for a minimum of six credits. M.S. students are required to enroll in PHAR 5393 for a minimum of four credits. Each student will register for 5393 each semester and is expected to attend all Medicinal Chemistry and Pharmaceutical Sciences Departmental seminars. Each student will present a seminar once per year.

**Related Area Requirement:** Ph.D. Students are required to complete at least six credits of coursework in areas related to Medicinal Chemistry. Courses are chosen by the student in consultation with their dissertation advisor and typically include courses from CHEM, MCB, or PNB.

**Elective Requirement:** Ph.D. students are required to complete at least 11 credits of elective coursework. The elective coursework can be from the Department of Pharmaceutical Sciences or from an area related to Medicinal Chemistry. Courses are chosen by the student in consultation with their dissertation advisor. This requirement may be waived for students with a prior Master's degree in a related area. M.S. students must meet the requirements of the UConn Graduate School in regards to total credit hours earned. These credits can be earned through coursework or lab research.

**Research Requirement:** Ph.D. students are required to take a minimum of 15 credits of GRAD 6950.

**Advancement to Candidacy.** There are two requirements for advancement to doctoral candidacy: passing the general examination and satisfying a third year progress review.

**Dissertation Proposal:** Submission of the dissertation proposal is required for Ph.D. students by the end of the second semester of the third year.

**Pharmacology and Toxicology.** The Division of Pharmacology and Toxicology is one of the three core disciplines within the Department of Pharmaceutical Sciences. Scholarly laboratory research and the education of graduate students in all aspects of drug and chemical action are paramount activities of the pharmacology and toxicology faculty. Therapeutic and toxic reactions to drugs and chemicals and their physiological and biochemical mechanisms of action are emphasized in this program. Emphasis is also placed in the areas of biochemical toxicology, inhalation toxicology, molecular toxicology, molecular pharmacology of nuclear receptors, hepatotoxicology, and immunology. The Division of Pharmacology and Toxicology grants Ph.D. degrees under two tracks: Pharmacology and Toxicology. The course and scholarly requirements for the Ph.D. degree are described in detail below. In addition, the Division offers a thesis-based master's degree, which requires 30 credits in total, to include at least 21 credits of advanced graduate coursework.

**Requirements:** Students pursuing the Ph.D. or M.S. degrees offered within the Division of Pharmacology and Toxicology must meet all requirements as stipulated by the Department of Pharmaceutical Sciences and the University of Connecticut Graduate School. Requirements for graduate studies in the Discipline of Pharmacology and Toxicology are summarized below.

**Core Requirements.** The following courses must be completed by all doctoral and master's graduate students enrolled in the Division of Pharmacology and Toxicology: 12 - 16 Credits of: GRAD 5910; PHAR 5403<sup>2</sup>, 5297, 5454, 5471, 5472; PNB 5302<sup>1</sup>.

<sup>1</sup> This course may be waived for students who have received an M.D., D.V.M., or Pharm.D. degree from an accredited U.S. institution. Students with a B.S. degree in Pharmacology and Toxicology and/or relevant course work from a U.S. institution may receive a comparable waiver.

<sup>2</sup> Must be taken twice, ordinarily in first and second years.

**Research Requirement:** Plan A M.S. students are required to take a minimum of nine credits of GRAD 5950. Ph.D. students are required to take a minimum of 15 credits of GRAD 6950.

**Additional Core Requirement for Toxicology Track:** PHAR 6455; PVS 3100.

**Seminar Requirement:** Two to four credits of PHAR 5475 and 5493. Seminars meet on a regular schedule, weekly or as announced, throughout the academic year and are required of all students. Students are expected to attend and to present seminars in every year of their graduate program. Up to four credits of seminar may be earned toward the Ph.D. PHAR 5493 is required for all students.

**Pharmacology/Toxicology Electives.** Each faculty member offers one or more specialty courses in their area of research specialization. Each graduate student in a Ph.D. program will take at least two of these specialty courses, one of the courses being given by faculty other than the student's major advisor, totaling four credits.

**Special Topics Electives.** Special topics elective courses are offered from time to time for variable credit by special arrangement with the faculty to provide a means to cover new topics not otherwise available in the regularly scheduled courses. These courses may be repeated for credit, as long as the content is not repeated.

**Statistics Requirement.** Students must complete a three credit graduate level course in statistics. Ordinarily this requirement will be met by completing a course in the Statistics Department. STAT 5605, 5625, or ANSC 5601 are statistic courses taken most commonly by graduate students in the program.

**Biochemistry Electives.** All Ph.D. students will complete electives from other departments on campus, with at least six credits in courses with significant biochemistry content. This requirement is typically met by courses offered through Molecular and Cell Biology and/or Biology or Chemistry Departments. MCB 5217, 5280, and 5427 are recommended.

**Academic Standards.** All graduate students in the Pharmacology/Toxicology program are expected to achieve a grade of "B" or better in all core courses. A grade below "B" in one or more core courses may subject the student to dismissal from the program.

**Qualifying Examination.** A written qualifying examination covering comprehensive content in Pharmacology must be passed by all doctoral and master's students.

**General Examination in Pharmacology/Toxicology.** A general examination is required for doctoral, but not master's students.

**Publications.** Ordinarily, it is expected that each student will have one or more publications accepted and one or more publications submitted at the time of the Ph.D. dissertation defense.

**Pharmaceutics.** Pharmaceutics is a highly multi-disciplinary field requiring expertise in chemistry, engineering, pharmacy, materials science, mathematics, and the biological sciences. The area of research ranges from fundamental studies of the physicochemical properties of drugs and related molecules to dosage forms and delivery systems. The Division of Pharmaceutics in the Department of Pharmaceutical Sciences offers the Doctor of Philosophy (Ph.D.) in Pharmaceutics. The Division also offers a Master of Science (M.S.) degree in Pharmaceutics; however, the Division does not admit students to the University for the specific purpose of earning an M.S. degree. Students may obtain an M.S. degree and must meet the Graduate School minimum requirements, including 30 credits approved by the major advisor. All students in the Ph.D. program are expected to complete at least 44 credits beyond the baccalaureate or its equivalent including at

least 15 credits of GRAD 6950. Students are expected to undertake an industrial internship for one or two summers. In addition, students must pass the qualifying examination in their first year, submit a plan of study in their second year, and pass a general examination in their third year. The final requirements for graduation are the completion of original research normally leading to the publication of several manuscripts and defense of a doctoral dissertation comprised largely from the manuscripts describing the original research.

**Prerequisites/Requirements for Incoming Students.** Students have succeeded in the Pharmaceutics Graduate program with backgrounds in Pharmacy, Chemistry, Chemical Engineering, Bioengineering, Polymer Science, Biology, Biochemistry and related fields. Students entering without four semesters of calculus and two semesters of physical chemistry are expected to complete these within their first year of graduate study. Other background courses may also be required by individual faculty members depending upon the nature of the student's prior education and future research direction. A qualifying examination will be administered to all incoming Pharmaceutics graduate students, regardless of previous educational or professional background. The passing grade on each of the qualifying examinations is 70%. Students who do not achieve passing grades on specific sections of the examination will be required to earn a "B" or better in the course covering that section for which their background was inadequate. Failure to pass any part of the examination or earn a "B" or better in the corresponding course(s) will ordinarily be grounds for dismissal from the program.

**Fundamental Course Requirements:** (Prerequisites if not previously completed: MATH 1131\* and 1132\*, 2110\*, and 2410\* or three credit equivalent). CHEM 3463; GRAD 5910; PHAR 5293\*\*, 5297.

**Core Requirements:** Choose at least four of five from PHAR 6234, 6285, 6286, 6288, or 6290.

\* Students will not receive graduate credit for this course.

\*\* Students should register for Seminar in the Spring of their 2nd and 4th years in the program.

**Elective Requirements:** PHAR 5297 and 6242. Students also take other electives outside of the discipline.

**Industrial Internships.** Students are expected to undertake an industrial internship for at least one summer, usually the summer between their first and second years in the program.

Seminars. While students are expected to attend the Pharmaceutics seminar each semester, students are only required to register for the seminar PHAR 5293 in the Spring of their 2nd and 4th year in the program.

**General Examination in Pharmaceutics.** The general examination in Pharmaceutics will be comprised of evaluation of the written Dissertation Proposal and an oral defense thereof.

**Academic standards.** Wherever a student's cumulative average falls below a 3.0 or if they receive a grade of "C" more than once, the student's progress will be reviewed by the Pharmaceutics faculty to determine whether or not the student shall be permitted to continue graduate study.

**Publications.** Ordinarily, it is expected that each student will have one or more publications accepted and one or more publications submitted at the time of the Ph.D. dissertation defense. Accepted and submitted publications are often included as chapters in the graduate student's Ph.D. Dissertation.

Timeline Guidance for Graduate Students:

First year	Complete qualifying examinations and/or prerequisites, submit Plan of Study
Second year	Present first seminar
Third year	Complete general examination, data review session with committee and present research seminar
Fourth year	Present research seminar and schedule additional committee meetings
Fifth year	Seminar and dissertation defense

## Polymer Science (M.S., Ph.D.)

*Jointly offered by the College of Agriculture, Health, and Natural Resources, College of Liberal Arts and Sciences, School of Engineering, School of Pharmacy, and UConn Health.*

The Institute of Materials Science Polymer Program serves as the sole center in the State of Connecticut for graduate research and education programs focusing on polymer science and engineering. The program is a nationally and internationally recognized center of excellence for interdisciplinary research and education in the fields of polymer science and engineering. The program is dedicated to meeting the educational needs of its graduate and professional students; providing lifelong learning opportunities in the study of polymeric materials; to assisting Connecticut industry in developing polymer technology; and to expanding and disseminating the global knowledge base regarding polymeric materials.

### Master of Science Program

Other than the GRE General Test scores, there are no special requirements for admission to the master's program beyond those of the Graduate School. Selection of Plan A (thesis) or Plan B (non-thesis) is made after consultation with the Advisory Committee. For Plan A, the student must successfully complete no fewer than 21 credit hours and no fewer than nine additional credits of Master's Thesis Research by taking GRAD 5950 or 5960, as well as writing an oral defense of a thesis. For Plan B, the student must successfully complete no fewer than 30 credits of advanced course work and a comprehensive final examination, but no thesis is required.

### Doctor of Philosophy Program

Admission to the doctoral program is based upon a careful assessment of the student's potential for creative research in polymer science. There are no special requirements for the doctoral program beyond those of the Graduate School, other than the GRE General Test scores.

**Requirements:** No fewer than 30 credit hours of advanced coursework, including POLY 5352, 5380, 5381, 5382, 5384, 6001; GRAD 6950 for at least 15 additional credits of Doctoral Dissertation Research. The General Exam, which consists of two parts: a written portion and an oral portion. The written portion is a comprehensive cumulative four-part exam. The oral portion is the writing and oral defense of a dissertation proposal. The Doctoral Dissertation, which consists of two parts: a written dissertation, and an oral defense of the dissertation before a committee of faculty and the general public.

# School of Social Work

## Social Work (M.S.W., Ph.D.)

The School of Social Work offers two graduate degrees: A Master of Social Work (M.S.W.) and a Doctor of Philosophy in Social Work (Ph.D.). The education program leading to the M.S.W. degree covers two academic years beyond the bachelor's degree. A minimum of 60 credits are required for the degree, 42 of which are obtained in classroom courses and 18 of which are in the form of field education. Courses and fieldwork are taken concurrently. The curriculum of the School is formed by an integrated sequence of foundation and advanced content, taken both in the classroom and field education. Upon application to the program, applicants must choose from three concentrations, Community Organizing (CO), Individuals, Groups and Families (IGFP), or Policy Practice (POPR), one of which will be the focus of the advanced content. The goal of the doctoral program in Social Work is to equip future social work leaders with the expert scholarly and research skills needed to provide intellectual leadership and direction to the profession. The program provides a rigorous curriculum designed to prepare social workers for careers as faculty in colleges and universities and as researchers. The curriculum reflects the particular attention given to the unique role of theory and research in the traditions of professional social work in relation to applied practice and to knowledge building.

### Master of Social Work Degree Requirements

Foundation courses required of all students: BASC 5300, 5333, 5350, 5362, 5390, 5391; FED 5301, 5302, 5351, 5352. Below are the advanced content by concentration requirements.

**Community Organizing Concentration Requirements:** CORG 5300, 5301, 5353, 5354, 5370; FED 5310, 5311; POPR 5310, 5312; RSCH 5341 or 5342; six credits of electives.

**Individuals, Groups and Families Concentration Requirements:** FED 5310, 5311; IGFP 5301, 5302, 5303; IGFP 5345, or 5346, or 5365, or 5342; IGFP 5353, 5354; RSCH 5341 or 5342; nine credits of elective courses.

**Policy Practice Concentration Requirements:** FED 5310, 5311; POPR 5300, 5301, 5302, 5310, 5311, 5312; RSCH 5341 or 5342; six credits of electives.

**Advanced Standing.** Candidates accepted as Advanced Standing students will have to complete 35 credits as a full-time matriculated student. Course requirements are listed below. This program begins in mid-July where a total of five credits are completed. After completion of the summer courses students will complete an internship and field seminar (560 hours, nine credits) as part of the advanced year, along with required courses and electives.

**Advanced Standing Summer Session Requirements:** Three credit Advanced Concentration course; one credit Skills Laboratory; one credit Special Populations course.

**Advanced Standing Fall and Spring Semester Requirements:** Nine credits IGFP; nine credits CORG and POPR; three credit Additional Research course; eight credits Advanced Field Education; one credit Advanced Field Advising Seminar; nine credits IGRP electives; six credits CORG and POPR electives, totaling 35 credits.

**Community Organizing Concentration Advanced Standing Requirements.** Summer Session: BASC 5301; CORG 5300, 5340. Fall and Spring: CORG 5301, 5353, 5354, 5370; FED 5310, 5311; POPR 5310, 5312; RSCH 5341 or 5342; six credits of electives.

**Individuals, Groups, and Families Concentration Advanced Standing Requirements.** Summer Session: BASC 5301; IGFP 5301, 5340. Fall and Spring: FED 5310, 5311; IGFP 5302, 5303, 5353, 5354; one of IGFP 5342, 5345, 5346, or 5365; RSCH 5341 or 5342; six credits of electives.

**Policy Practice Concentration Advanced Standing Requirements.** Summer Session: BASC 5301; POPR 5300, 5340. Fall and Spring: FED 5310, 5311; POPR 5301, 5302, 5310, 5312, 5353, 5354; RSCH 5341 or 5342; six credits of electives.

**Advanced Standing Courses Waived:** BASC 5333, 5350, 5362; six credits BASC 5390; FED 5301, 5302, 5351, 5352.

**Bachelor of Social Work Exemption.** Students who received a Bachelor of Social Work (B.S.W.) within six years from an undergraduate school

accredited by the Council on Social Work Education will be automatically exempt from up to six courses if a grade of “B” or better was earned and course content is equivalent.

### **Doctor of Philosophy Requirements**

The course of study for the Doctor of Philosophy (Ph.D.) in Social Work consists of 51 graduate credits. Ten required courses totaling 30 credits provide the students with competency in advanced research methods and statistics, and social science theories. The remaining courses include two elective courses totaling six credits in related disciplines and 15 credits of dissertation research.

**Doctor of Philosophy Required Courses:** SSW 6410, 6411, 6412, 6413, 6414, 6420, 6435, 6436, 6445, 6446.

# Sixth-Year Diploma in Professional Education

## **Cognition, Instruction and Learning Technology (CILT) (Sixth-Year Diploma)**

The Department of Educational Psychology (EPSY) offers a Sixth-Year Diploma (SD) program in Educational Psychology: Cognition, Instruction and Learning Technology (CILT). The CILT program approaches learning and instruction from an applied view of the Learning Sciences. It aims to prepare scholars and practitioners who are well versed in different perspectives on teaching and learning and capable of critically evaluating the effectiveness of instructional technologies and techniques across different populations and contexts (including virtual, traditional face-to-face, and blended). Applicants for the Sixth-Year must hold a Master’s degree in a related area.

**Sixth-Year Diploma Requirements.** The Sixth-Year Diploma (SD) requirements in CILT conform to the Graduate School requirements. Specific programmatic requirements and course sequences for SD students are described below. The SD in CILT requires a minimum of 30 credits comprised of core (see below) and elective courses. The SD requires a plan of coursework created with the student’s primary advisor and advising committee, followed by comprehensive examinations. The list below represents courses typically included in the plan of study for the CILT SD degree. Waivers and substitutions for these courses are allowed with approval from the student’s primary advisor and advising committee.

**Core Courses:** EPSY 5605, 5607, 5510, 5601, 5602, 5220, 5515, 5530, 5520.

## **Counseling (Sixth-Year Diploma)**

The Sixth-Year Counseling Program is designed for those students whom have already completed a Master’s degree in a field of study not related to school counseling. These students complete the same sequence of courses and performance criteria as in the School Counseling Master’s Program, but are awarded the Sixth-Year Diploma.

**Practicum.** Students complete supervised counseling practicum experiences that total a minimum of 100 clock hours over a full academic term that is a minimum of 10 weeks.

**Internship.** School counseling students complete a supervised internship. As of December 1, 2017, the Connecticut State Department of Education will accept a minimum of 700 clock hours of internship over 10 school months to fulfill this requirement.

**Final Examination.** Students must pass a Comprehensive Exam in order to graduate from the University of Connecticut, School Counseling Program. The National Counselor Exam (NCE) is optional, and required only if students want to become a Nationally Certified Counselor and/or a Nationally Certified School Counselor.

**Required Courses.** Students in the Sixth-Year Counseling programs must complete all of the following courses with a grade of “B” or better: EPSY 5108, 5195, 5301, 5304, 5306, 5307, 5308, 5314, 5315, 5316, 5317, 5318, 5319, 5320, 5406, 5601.

## **Curriculum and Instruction (Sixth-Year Diploma)**

**Sixth-Year Diploma in Bilingual and Bicultural Education, Reading Education, Elementary Education, or Secondary Education (English, World Language, History and Social Studies, Mathematics, and Science).** The plan of study is structured to continue the academic preparation of experienced and qualified educational leaders, supervisors, and master teachers in their areas of specialization. The Curriculum and Instruction Department offers Sixth-Year Diplomas in Bilingual and Bicultural Education, Elementary Education, and Secondary Education with concentrations in English Education, World Language Education, History and Social Studies Education, Mathematics Education, and Science Education. (The Department also offers Sixth-Year Diplomas in Reading Education, Reading and Language Arts Consultant, Remedial Reading and Language Teacher, which are described below). The Sixth-Year Diploma provides advanced graduate students an opportunity to increase their

professional competence by pursuing a course of study beyond the Master's degree under the guidance of a faculty member in Education, Curriculum, and Instruction (EDCI). The program is structured to continue the academic preparation of experienced and qualified educational leaders, supervisors, and master teachers in their areas of specialization.

**Requirements.** The Sixth-Year Diploma requires satisfactory completion of at least 30 credit hours in a planned program of professional education beyond the Master's degree. Students must maintain at least a "B" average. The plan of study is individualized and designed by the student with the advisor to reflect the student's stated objectives and field of concentration. Courses are drawn from EDCI, EPSY, EDLR and fields beyond Education as determined appropriate by the advisor. A course taken previously as part of the student's Master's degree program may be re-taken and included in the plan of study if 10 years have lapsed since it was originally taken. If certification is a goal (e.g., certification as a Reading Consultant), the student follows the recommended plan developed to account for the State's certification requirements. Required courses and electives will be identified based on a review of the student's transcript and the state requirements. Students must also fulfill the requirement of a comprehensive, written examination established by the student's advisor. This may include an oral component (optional) and is submitted to the Graduate School.

**Sixth-Year Diploma in Reading and Language Arts Consultant or Remedial Reading and Language Teacher.** The plan of study is structured to continue the academic preparation of experienced and qualified educational leaders, supervisors, and master teachers in their areas of specialization. The Sixth-Year Diploma provides advanced graduate students an opportunity to increase their professional competence by pursuing a course of study beyond the Master's degree under the guidance of a faculty member in Education, Curriculum, and Instruction (EDCI). The Diploma may provide a vehicle, as appropriate, for the fulfillment of certification requirements for several areas (e.g., Reading Specialist at the Teacher and/or Consultant levels). The plan of study is individualized and designed by the student with the advisor to reflect the student's stated objectives and field of concentration. Required courses and electives will be planned by the advisor and student to fulfill the student's individual objectives. If certification is a goal (e.g., certification as a Reading Consultant), the student follows the recommended plan developed to account for the State's certification requirements. Reading education professors/advisors will review these certification requirements with the student and advise appropriate course work to fulfill state requirements. Required courses and electives will be identified based on a review of the student's transcript and the state requirements. Students are advised to contact an advisor to initiate planning; a transcript will be necessary to complete this process.

**Sixth-Year Diploma General Requirements.** For all Sixth-Year Diplomas in Professional Education, students must earn at least 30 credits in a planned program of professional education beyond the Master's degree. Courses are drawn from EDCI, EPSY, EDLR and fields beyond Education as determined appropriate by the advisor. A course taken previously as part of the student's Master's degree program may be retaken and included in the plan of study if 10 years have lapsed since it was originally taken. Students must pass a comprehensive, written examination. There may also be an oral component (optional).

**Remedial Reading and Language Arts Teacher Required Course:** Six credits of EDCI 5155.

**Remedial Reading and Language Arts Teacher Electives.** Selections are based on the student's transcript and prior course work. The following are possible suggestions: three credits of EDCI 5099; three credits of EDCI 5100, 5125, or EDCI 5115; and three credits of EDCI 5105 or 5110. Three credits of EDCI 5135 or 5125; three credits of EDCI 5140; three credits of EDCI 5130 or 5250; six credits of EDCI 5145 and 5150 (EDCI 5120 if approved by the advisor); EPSY 5108; related courses in language and/or literacy, curriculum, educational psychology, or educational leadership (EDCI, EPSY, EDLR); Culminating Requirement is the Portfolio/Exam.

**Reading and Language Arts Consultant Required Courses:** EDCI 5092 for six credits; and EDCI 5160.

**Reading and Language Arts Consultant Electives.** Selections are based on the student's transcript and prior course work. The following are possible suggestions: six credits of EDCI 5100, 5105, 5110, 5115, EDCI 5125; three credits of EDCI 5135, or 5125; EDCI 5140; three credits of EDCI 5130, or 5250; six credits of EDCI 5145, 5150, 5120; six credits of EDCI 5155;

three credits of EPSY 5108; three credits of EDCI 5099; related courses in language and/or literacy, curriculum, educational psychology, educational leadership (EDCI, EPSY, EDLR); Culminating Requirement is the Portfolio/Exam.

## Educational Administration (Sixth-Year Diploma)

### *University of Connecticut Administrator*

#### *Preparation Program (UCAPP)*

The Sixth-Year Certificate Program in Educational Administration, University of Connecticut Administrator Preparation Program (UCAPP) is an administrator certification program. Graduates are eligible for endorsement for Intermediate Administrator (092) certification. UCAPP offers traditional, urban, and turnaround school leadership preparation experiences. Cohorts consist of students from various geographic regions across the state.

**Year One, Summer Required Courses:** EDLR 5306, 5307; one credit of EDLR 5092.

**Year One, Fall Required Courses:** EDLR 5303; two credits of EDLR 5092.

**Year One, Spring Required Courses:** EDLR 5302; two credits of EDLR 5092.

**Year Two, Summer Required Course:** three credits of EDLR 5092.

**Year Two, Fall Required Courses:** Two credits of EDLR 5092; three credits of EDLR 5304.

**Year Two, Winter Required Course:** EDLR 5305.

**Year Two, Spring Required Courses:** EDLR 5310; two credits of EDLR 5092.

## Educational Technology (Sixth-Year Diploma)

The Department of Educational Psychology offers a Sixth-Year Diploma program in Educational Technology, featuring the Two Summers Sixth-Year Diploma online option and campus-based programs. The graduate program in Educational Technology prepares educators to put theory into practice in service to the wise integration of technology in formal and informal learning environments. Applicants for the Sixth-Year must hold a Master's degree in a related area.

**Requirements.** The Sixth-Year Diploma in Educational Technology requires 30 credits. For the "Two Summers Sixth-Year Diploma" online option, students work in a cohort program to fulfill the program requirements.

**Two Summers Requirements:** EPSY 5198, 5215, 5220, 5225, 5235, 5245, 5339, 5510, 5520, 5601.

## Giftedness, Creativity, and Talent Development (Sixth-Year Diploma)

The Sixth-Year Diploma in professional education is for students who have already earned a Master's degree and wish to pursue further education in the area of Giftedness, Creativity, and Talent Development. The Sixth-Year Diploma program mirrors the Master of Arts (M.A.) degree and prepares individuals for specialization in teaching in gifted and talented programs, as well as for leadership roles in creativity and gifted education as program coordinators, curriculum development specialists, and regional or state gifted education agency directors. The program of study includes coursework on strategies and program models for developing student talent and field experiences in school settings.

**Requirements.** The Sixth-Year Diploma requirements in Giftedness, Creativity, and Talent Development conform to the requirements of the Graduate School and the Department of Educational Psychology. Specific course requirements include those listed below as well as requirements determined by the student's major advisor and program faculty consistent with the minimum requirements. The Sixth-Year Diploma requires satisfactory completion of at least 30 credits maintaining at least a "B" average. The required courses include those listed below; the remaining credit hours come from elective courses approved by the student's major advisor.

**Required Courses:** EPSY 5092, 5194, 5601, 5710, 5720, 5750; at least one of the following, at the direction of the major advisor: EPSY 5740, 6770.

**Required Examinations.** Students must complete required computer-based examinations near the completion of their required coursework. Passing scores on the examinations are required for degree completion.

### School Psychology (Sixth-Year Diploma)

The Sixth-Year Diploma program is designed to prepare qualified school psychologists to practice in public schools or related educational settings. The program is accredited by the Connecticut State Board of Education and is approved by the National Association of School Psychologists and the National Council for Accreditation of Teacher Education (NCATE). It requires a student to already hold a Master's degree in School Psychology or related area. The Sixth-Year Diploma in School Psychology requires 45 credits beyond those required for the Master's degree, including practica and internship. In addition to the courses required for the Master of Arts (M.A.) in School Psychology, described separately, to receive the Sixth-Year Diploma in School Psychology, students must satisfactorily complete the required courses listed below.

**Required Courses:** EPSY 5405, 5406, 5408, 5425, 5435, 5440, 5445, 5450; EPSY 5092 for three semester hours per semester, for two semesters, for a total of six semester hours beyond the M.A. practicum; EPSY 5491 School Psychology Internship for 6-12 semester hours per semester, for two semesters.

**Portfolio Requirement.** Prior to doing the required internship, students must prepare a pre-internship portfolio, which consists of work samples completed throughout the program in coursework and practica, professional documents, practicum and self-evaluations, and other relevant program-related documents.

**Examination Requirement.** Students are also required to take the Praxis Series - School Psychologist (code 5402), which is administered by the Educational Testing Service. Students take the examination after admission to the Sixth-Year program; after completing approximately 42 hours of their coursework in the combined Master's/Sixth-Year program; and prior to beginning their internship.

**Practica Requirements.** Students are required to complete practicum experiences in a school or related educational setting. The practica sequence was developed in accordance with American Psychological Association (APA) and National Association of School Psychologists (NASP) guidelines that require planned supervised experiences that include direct service and formally scheduled supervision. This requirement is met through the EPSY 5092 requirement included in the coursework list above.

**Internship Requirements.** Students are also required to satisfactorily complete an internship. The internship in school psychology complies with American Psychological Association (APA) and National Association of School Psychologists (NASP) standards. It is designed to enhance the development of competencies and professionalism and to be the culminating experience in the student's program. To be eligible for the internship, the student must have met all the requirements prior to signing any contract or internship agreement with an internship site.

### Special Education (Sixth-Year Diploma)

The Sixth-Year program in Special Education is designed for a broad range of professionals (e.g., general or special education teachers, graduates in related fields) to provide in-depth learning and experiences related to supporting children and adults with disabilities and at risk for learning and behavioral difficulties. This program provides advanced study in three areas: Literacy Supports for Students at Risk for Learning Difficulties; School-wide Positive Behavior Supports (SWPBS); and Transition and Postsecondary Supports. Students also may design an individualized plan of study with the approval of their advisor. Students completing the Sixth-Year program develop an individualized plan of study that includes at least 30 credits in special education and related areas.

## Certificate Programs

The University of Connecticut offers two types of certificate programs: graduate certificates and post-baccalaureate certificates. Graduate certificate programs consist entirely of graduate courses (those numbered 5000 or above). Post-baccalaureate certificate programs consist either entirely of undergraduate courses (those numbered 1000-4999) or of a mixture of undergraduate and graduate courses. A certificate can be earned either as a "stand-alone" certificate (without simultaneous enrollment in a degree program) or while simultaneously pursuing a graduate degree. To earn a certificate, students must first apply for admission to a certificate program through the Graduate School. This applies to both external applicants and currently matriculated students who wish to pursue a certificate along with a graduate degree.

### College of Agriculture, Health and Natural Resources

#### Diagnostic Genetic Sciences

The Diagnostic Genetic Sciences (DGS) major is a two-year educational and clinical post-baccalaureate training program in genetic testing. It is open to individuals with a bachelor's degree in the biological, laboratory or natural sciences, and who meet the specific course prerequisites and academic standards. Diagnostic genetic sciences include the evaluation of chromosomes and DNA for the prediction of risk for disease, diagnosis of disease, and/or identification of prognostic biomarkers of survival or therapy. Students in the program take course work and laboratory training for three semesters on the University of Connecticut Storrs campus in the two disciplines of DGS: Cytogenetics and Molecular Diagnostics, but concentrate in one or the other during their fourth and final internship semester at an affiliated cytogenetics lab or molecular lab. The cytogenetics and molecular diagnostic sciences concentrations of the DGS Program are both accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). The DGS curriculum includes didactic, laboratory, internship and research experience to prepare students for careers as integral members of laboratory teams and for the pursuit of graduate training, research and medicine that will result in advancement of the body of knowledge in the genetic sciences. Upon completion of the DGS Program, graduates with a concentration in cytogenetics are eligible to sit for the certification examination in Cytogenetics, and graduates with a concentration in molecular diagnostics are eligible to sit for the certification examination in molecular Biology, both offered by the American Society of Clinical Pathologists, Board of Certification (ASCP BOC). However, note that certificate conferral is not contingent upon passing any external certification or licensure examination.

**Requirements.** All students must pass all of the following courses with a grade of "C" or better; no student may take a course listed unless that student has earned a grade of "C" or better in that prerequisite course; and no course may be repeated more than once (for a total of two times).

**Required courses:** AH 2001, 3121, 4241; DGS 3222, 3223, 3225, 4224, 4234, 4235, 4236, 4246, 4248; MLSC 4500; totaling 31 credits. In addition, each student must choose one of the following 16 credit concentrations and complete the required courses with a grade of "C" or better, for that concentration.

**Cytogenetics Concentration Required Clinical Courses:** DGS 4810, 4820, 4830, 4850.

**Molecular Concentration Required Practicum Courses:** DGS 4402, 4604, 4605, 4503, 4850.

**Clinical Experiences.** All students are also required to complete a six-month clinical affiliation as a part of the required curriculum. Students are placed in sites for which a valid agreement with the University exists at the time of the placement decision. Travel for internship interviews is required and relocation may be necessary for the final semester.

**Additional Requirements.** Students must maintain standards of professional conduct as outlined in the program policies and procedures handbook, and Clinical Affiliation Packet. In addition, students must receive a "C" or better on an affective evaluation at the mid-point of the

clinical internship semester to continue in the DGS program. Students must document required immunizations and health-related tests/screening, and compliance with relevant Occupational Health and Safety Administration (OSHA) regulations and with the Health Insurance Portability and Accountability Act (HIPAA). Finally, all students must carry the required health and liability insurance.

### Exercise Prescription

The graduate program in Exercise Prescription is a three-course, nine-credit, online graduate certificate program. The program provides advanced knowledge in exercise prescription for individuals working in healthcare, personal training, fitness and kinesiology industries. Admission to the graduate program in Exercise Prescription requires completion of an undergraduate degree in exercise science, or related health and science fields. Please contact the Department of Kinesiology or visit [www.kins.uconn.edu/](http://www.kins.uconn.edu/) for instructions on how to apply.

**Requirements:** KINS 5507, 5508, and 5595. It is recommended that the courses be completed in the order listed but KINS 5507 must be completed before KINS 5508 and 5595.

### Health Promotion and Health Education

The Certificate in Health Promotion and Health Education (HPHE) is a one-year comprehensive program that encompasses health promotion, health education, nutrition and community health, and environmental health and is designed for individuals interested in pursuing certification in health promotion and education.\* A certified health educator specialist is a competent professional committed to continued development in the field of health education and health promotion. These individuals design, conduct and evaluate activities in a variety of settings to improve the health of all people. Certified health educators may pursue employment as patient educators, health education teachers, health coaches, community organizers, public health educators, and health program managers. Individuals who successfully complete the Allied Health Graduate Certificate in HPHE are eligible to take the Certified Health Education Specialists (CHES) examination administered by the National Commission for Health Education Credentialing Inc. (NCHEC).

**Requirements.** The student develops a plan of study with the assistance and approval of the Allied Health Graduate Certificate Program Coordinator. Core competency course work completed at another institution or in another department within the University of Connecticut may apply toward a student's Graduate Certificate in HPHE plan of study with the approval of Allied Health Certificate Program Coordinator. However, a minimum of 12 credits in health promotion and health education must be completed within the Department of Allied Health Sciences at the University of Connecticut. Successful completion of the Graduate Certificate in HPHE requires enrollment in each course for a letter grade, a "B" or better in the required courses, and an overall earned grade point average in the Graduate Certificate Program in HPHE of 3.0 or higher.

**Course Requirements:** AH 5319, 6305, 6324, and a minimum of three elective credits from within the graduate course offerings in the Department of Allied Health Sciences.

\* This program is not accepting new applicants at this time.

### Medical Laboratory Sciences

Medical Laboratory Sciences (also known as Medical Technology or Clinical Laboratory Sciences) is the branch of laboratory medicine which deals with the study of blood and other body specimens to aid in the diagnosis of human disease, determine optimal therapy, and monitor the progress of treatment. Medical Laboratory Scientists are essential members of the healthcare team who are responsible for performing the analysis, evaluating normal and abnormal results, and correlating the results with disease states. The information they provide physicians is essential to patient care. They are involved with every aspect of clinical laboratory testing including method development, analysis, quality assurance, training of personnel, and laboratory management. Areas of the clinical laboratory include hematology, immunology, microbiology, chemistry, transfusion services, urinalysis and molecular diagnostics.

The Medical Laboratory Sciences Certificate program is open to individuals who possess a bachelor's degree in Biology, Chemistry, Molecular and

Cell Biology, or a related subject area and have completed the appropriate prerequisite courses. The certificate program starts in the spring semester. The one and a half year program includes two semesters at the Storrs campus, plus eight weeks of summer courses, followed by an 18 week clinical (practicum) rotation conducted at one of several clinical affiliates throughout the state. The Medical Laboratory Sciences Program is fully accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). As such, students who have successfully completed the program, may sit for the national certification examination offered by the Board of Certification of the American Society for Clinical Pathology (ASCP).

**Required Courses:** AH 2001 and 4241; DGS 4234 and 4235; and MLSC 3301, 3333, 3365, 4301, 4302, 4311, 4312, 4321, 4322, 4341, 4342, 4351, 4352, 4371, 4372 and 4500, for a total of 50 credits.

### Occupational Safety and Health

The Department of Allied Health Sciences offers a post-baccalaureate online certificate program in Occupational Safety and Health (OSH). The 15-credit certificate program may be completed entirely online. For students who wish and are able to experience one or more courses in a classroom environment, however, some courses also are offered in a classroom.

The certificate program is designed for individuals who possess a bachelor's degree and who wish to enter the exciting and growing profession of occupational safety and health. It is also designed for individuals already practicing in the profession but who are interested in gaining an academic foundation to improve their work performance and enhance their professional advancement.

**Requirements:** In addition to the Graduate School general requirements for Certificate Programs, the following course work is required (each course is equivalent to three credits):

**Required Core Courses:** (nine credits) AH 3570, 3571, and 3573.

**Elective Courses:** (six credits) AH 3173, 3175, 3275, 3278, or 3574.

Each required and elective course taken must be passed with a grade of B (not B-) or higher to count toward the certificate requirements.

### Sustainable Environmental Planning and Management

This is an online program offered by the Department of Natural Resources and the Environment. The SEPM program is designed for college graduates and graduate students looking to enter environmental planning or management fields, and working professionals looking to enhance their skills or prepare for a graduate degree program. It takes about 12 to 18 months to complete, and conforms to requirements of the Graduate School as outlined in the Academic Regulations section, with the exception that GRE scores are not required for admission to this program.

**Required Courses:** 12 credits of NRE 5200 and 5220.

**Additional Coursework:** Two of the following three courses: NRE 5205, 5210, or 5585.

### School of Business Accounting Fundamentals

Designed for students who do not have an undergraduate degree in Accounting and want to take graduate-level classes to further their proficiency. Graduates from the certificate will have the opportunity to transition into the Master of Science in Accounting. Students must complete 12 credits in required courses.

**Required Courses:** ACCT 5122, 5124, 5243, and 5260.

### Advanced Business Certificate in Accounting Analytics

Designed for students who are accepted into the Master of Science in Accounting (MSA) degree program, and for students seeking a stand-alone certification. For current MSA students, participation in the certificate is elective. Students in this certificate are interested in supplementing their graduate accounting studies with a skillset, which applies modern analytical methods yielding descriptive, diagnostic, predictive and prescriptive accounting information used for business intelligence. To obtain this certificate, students must complete 12 credits in the required courses.

**Required Courses:** ACCT 5532, 5554, 5555, and 5557.

### Advanced Business Certificate in Business Analytics

This certificate is designed for business managers and information professionals who are interested in the role of business analytics in organizations and how data analytics can be applied to help make better business decisions. Students must complete 15 credits.

**Required Courses:** OPIM 5603, 5604, 5671, and 5272.

**Required Electives:** One elective from the following list: OPIM 5501, 5502, 5503, 5504, 5505, 5641, or three credits of other OPIM 5000-level coursework with permission of the Department.

### Advanced Business Certificate in Digital Marketing Strategy

The Marketing Department offers an Advanced Business Certificate for business professionals who are interested in careers in the areas of digital marketing and analytics, big data and strategic marketing, marketing research, customer relationship management, and targeted database marketing. Students must complete 15 credits.

**Required Courses:** MKTG 5115\*, 5251, and 5665.

**Required Electives:** One elective from the following list: MKTG 5640 or 5650; plus one additional 5000-level MKTG course or one of the following: OPIM 5502, 5503, 5604, or 5671.

\* Prerequisite for all other 5000-level Marketing courses.

### Advanced Business Certificate in Health Care Analytics

This program is designed for people who want to use healthcare analytics in the systematic use of data to drive evidenced-based decision making in clinical and business settings. Students must complete 12 credits.

**Required Courses:** HCMI 5240 and 5243;\* two electives from the following list: OPIM 5604, 5641, 5671, or 5272.

\* The Finance prerequisite is waived for this certificate.

### Advanced Business Certificate in Health Care Finance and Insurance

This graduate-level certificate is designed for business professionals who are interested in careers in the area of health care economics, finance and insurance. Students must complete 12 credits.

**Required Courses:** HCMI 5240 and 5243; two electives from the following list: FNCE 5202; HCMI 5221, 5686, 5687, or 5688.

### Advanced Business Certificate in Human Resource Management

The Advanced Business Certificate in Human Resource Management is an option for graduate business students seeking a concentration in human resources and for current professionals looking for a focused study in human resources. Students must complete 12 credits.

**Required Courses:** MGMT 5138; three electives from the following list: MGMT 5223, 5250, 5639, 5650, or 5678.

### Advanced Business Certificate in Information Technology Audit

This graduate-level certificate is designed for IT professionals and auditors who wish to enhance their functional knowledge of IT and audit issues. Students must complete 15 credits.

**Required Courses:** ACCT 5543 and 5553; OPIM 5165, 5272, and 5894.

### Advanced Business Certificate in Project Management

This graduate-level certificate is designed for business professionals who wish to enhance their project management skills. Students must complete 12 credits.

**Required Courses:** MGMT 5620; OPIM 5270, 5668; one elective from the following list: OPIM 5507 or 5894; (Special topics courses vary, selection

must be approved by the OPIM Department Head); three credits of other OPIM 5000-level coursework with permission of the Department.

### Corporate and Regulatory Compliance

This certificate is designed for business professionals who are interested in careers in compliance, ethics, internal monitoring, regulatory affairs, and related areas. Students must complete 12 credits.

**Required Courses for current MBA and post-baccalaureate students:** BLAW 5894; LAW 7554, 7553, and at least three credits from the following list: BLAW 5175, 5181, and 5182.

**Required Courses for current JD and JD-degree holders:** BLAW 5894; LAW 7553, 7554, and at least three credits from the following list: ACCT 5121; BLAW 5220, 5660, 5680; LAW 7650, 7673, 7675, 7677, 7717, 7724, 7737, 7755, 7773, 7844, 7962; MGMT 5138, 5223\*, OPIM 5165, 5771\*, or 5604\*\*.

\* By permission of instructor.

\*\* By permission of instructor; formal background in statistics required.

### Global Risk Management

This is an online graduate-level certificate program designed for working professionals looking to advance their careers or for career changers, and recent graduates interested in obtaining a certificate to validate their skills and commitment to the highest standard of professionalism and best practices within the risk management profession. Students must complete 12 credits.

**Required Courses:** FNCE 5894 when taught as the following three credit seminars: Risk Management Structures, Credit Risk Management, Market Risk Analysis, and Operational Risk Management.

### Long-Term Health Care Management

This program is designed to meet all State of Connecticut requirements for long-term healthcare administration licensure. The primary objective of the program is to prepare students for careers in long-term health care management. Students must complete 12 credits.

**Required Coursework:** HCMI 5549 for three credits and HCMI 5632 for nine credits (900 hours).

## School of Engineering

### Advanced Systems Engineering

The UTC Institute for Advanced Systems Engineering offers a 12-credit certificate program to train engineers in urgently needed cyberphysical systems (CPS) related disciplines that are pivotal to innovation and product enhancement in the globally competitive economy. The certificate program builds competency in analytical systems engineering related to system modeling, uncertainty analysis, and robust design of physical, embedded, and control systems. The program aims to teach engineers analysis, architecture selection, model-based system engineering methods, decision-making, optimization, verification and validation of engineered systems.

**Required Courses:** One introductory course: SE 5000 or 5001; one modeling course: SE 5001, 5101, or 5201; one concentration course: SE 5102, 5202, 5302, 5402, 5095, or 5502. The required fourth course can be selected from any of the three categories.

### Composites

The Mechanical Engineering Department and Materials Science and Engineering Department at the University of Connecticut in collaboration with industry partners offer a 12 credit certificate program for practicing engineers who want to pursue advanced education on composite materials and structures. This program boosts students' overall composites proficiency, with curriculum focused on the fundamentals of composites combined with practical skills and hands on exercises. Students gain the necessary depth of study for a thorough understanding of modern composite technologies.

**Required Courses:** ME 5430 and 5442; two elective courses: MSE 5320, 5364, 5443 or 5522.

## Contaminated Site Remediation

The Civil and Environmental Engineering Department offers a 12-credit certificate program in Contaminated Site Remediation. The courses provide the necessary knowledge at an advanced level to engage in the design of contaminated site investigation, remediation and redevelopment. Students learn to use appropriate tools for the planning of subsurface investigations and design waste containment systems, and to apply fundamental physical, chemical and biological principles of soil and groundwater treatment methods in the context of the appropriate regulatory framework.

**Required Courses:** ENVE 5210, 5252, and 5530; one elective course: ENGR 5312, 5314; ENVE 5240, 5310, 5311, 5320, 5370, 5821, or 5830.

## Power Engineering

The Electrical and Computer Engineering Department offers a 12-credit certificate program in Power Engineering. The courses provide the necessary knowledge at an advanced level to engage in the analysis and design of power systems. Students will learn how to model major components used in the generation and distribution of power, analyze the systems and methods used for the monitoring and protection of power systems, use appropriate tools and techniques for the planning and design of power systems, and choose suitable devices for integrating various power sources into a grid.

**Required Courses:** ECE 5510, 5512, 5520, and 5540.

## Enrichment Programs

### Medicine and Dental Medicine Post Baccalaureate Program

The University of Connecticut Post Baccalaureate (PB) Program is a small, highly selective certificate program. Its mission is to prepare students who have completed an undergraduate degree and wish to strengthen their preparation for professional school. The program is offered in two forms. Program A requires 60 credits and is typically completed in four semesters (two years) of Fall and Spring Semester coursework. It is recommended for students who are making a career change to medicine or dentistry. Program B requires 30 credits and is typically completed in two semesters (one year) of Fall and Spring Semester coursework. It is recommended for students who have already taken numerous undergraduate courses concentrating in math and biosciences but need advanced level courses in these areas to enhance their application to professional schools. Under both Program A and Program B, students take primarily undergraduate courses to complete the program requirements.

**Prerequisites for Applicants.** Completion of all requirements for a baccalaureate degree must be from an accredited college or university. Applicants may apply while in their final year of a bachelor's program. An undergraduate GPA of a minimum 3.25 or better is required for Program B; 3.50 or better for Program A. Exceptions are considered only in special circumstances after review by the Program Director with a documented history of community service and documented experience in a relevant health care field. Test scores are considered if applicant has any to report but they are not a required element of the application. Successful applicants must have demonstrated a commitment to the community (evidenced by a history of community service activities) and must have a strong understanding of their respective health professional goal (obtained from activities such as volunteer experience, shadowing experience, or work activities in private practice, clinic, or hospital settings). The Post Baccalaureate Program assesses applicants using a holistic review methodology, so that all aspects of a candidate's history are considered. Each student's non-academic requirements will be evaluated based on their prior activities and an appropriate level of activity identified for completion during the winter or summer breaks. Research projects should be undertaken for an entire summer.

**Requirements for Enrolled Students.** There are no specific course requirements. The course schedule is individually tailored to fit each student's interests and needs in consultation with the program advisor based on their health professional goals. No withdrawals (grade of "W") will be considered unless due to difficult personal circumstances. Students must maintain a minimum 3.25 GPA and 15 credits each semester (12 credits of science) unless otherwise advised. Students complete experiential and

programming activities as specified by the Enrichment Programs Office in consultation with the respective professional school. These include (limited and tailored so as not to interfere with course demands): required community service activities over course of program; required participation in conferences, seminars, and guest lecture presentations at the Storrs campus; required participation at targeted academic seminars, visits to professional schools, research seminars, inter-professional education activities, and other relevant activities off campus; optional research component at the main campus, Health Center complex, or participating hospitals during summer semester break. Additional clinical work, shadowing experience, community service, MCAT/DAT Review Courses offered by the University are also recommended.

## School of Fine Arts

### Arts Administration

The Department of Dramatic Arts offers an online graduate certificate in Arts Administration. The certificate comprises four required courses totaling 12 credits. The four courses in the program emphasize the critical areas of governance/leadership, budgeting/finance, fundraising, and marketing. The goal of the curriculum is to provide a deep conceptual context for the work of arts organizations coupled with practical classroom training in an active online learning environment. The program incorporates case studies, group work, project-based assignments, and guest lecturers that bring real-world knowledge to the classroom. This program can be completed in 12 months. Classes are non-sequential.

**Required Courses:** DRAM 5120, 5121, 5122, and 5123.

### Digital Media and Design

The Online Graduate Certificate in Digital Media and Design is a four-course, 12-credit program that mixes theory with experiential learning. The program is designed for professionals, or those with a desire to pivot to a career in digital media. It provides a foundation of skills and knowledge in digital marketing applications for businesses and organizations in four key areas; design, web development, digital media strategies and digital analytics. It is designed for college graduates working or hoping to work in the areas of advertising, communications, marketing, creative design and media, as well as for graduates from programs in Communication, Social Sciences, Marketing, Business, Engineering, Sciences, the Arts and other related disciplines who are interested in expanding their digital skills.

**Required Courses:** Taken in sequential order, beginning with two courses taken in the summer semester DMD 5000 and 5070; DMD 5700 in the fall semester; DMD 5720 in the spring semester.

### Music Performance

The Music Performance Certificate program requires satisfactory completion of at least 12 credits, with a minimum GPA of 3.0. Students in the program are required to take two semesters totaling eight credits of MUSI 5323 and to present a non-credit public recital. Additional course requirements are discipline-specific, as listed below.

**Certificate in Strings, Winds, or Percussion:** Two semesters of MUSI 5305 and two semesters of MUSI 5324.

**Certificate in Piano:** Two semesters of MUSI 5300 and two semesters of MUSI 5324.

**Certificate in Voice:** Two semesters of MUSI 5305 or 5325, and two semesters of MUSI 5300.

**Certificate in Conducting:** Two semesters of MUSI 5305 and two semesters of MUSI 5331.

### Puppet Arts

The Department of Dramatic Arts offers an online graduate certificate in Puppet Arts. The certificate is comprised of four required courses totaling 12 credits. The courses in the program emphasize the construct puppets using a variety of techniques, including sculpting, molding, casting, painting, and carving and how puppetry can be used as a global art form. Students will also gain insights into the history of puppetry and will have an understanding of the larger context of the field and how traditions influence practices today. This program can be completed in 17 months.

**Required Courses:** DRAM 5607, 5610, 5613, and 5617.

## UConn Health

### Addiction Sciences

This is a four-course, 12 credit certificate designed to promote an understanding of basic, clinical, epidemiological and policy research on alcohol and other substances. It is intended for a wide array of health professionals, including individuals currently practicing in their professions and those in training for research, program management and clinical careers. The program requires a grade of “B” in all courses.

**Required Courses:** PUBH 5478, 5479, 5480, and 5481.

### Biomedical Science Research Experience

This graduate certificate program allows students with a bachelor’s degree to have a mentored research experience with a faculty member at UConn Health. Enrolled students gain relevant experience that will assist them in determining if a career in research is of interest to them. In addition, this research experience will likely strengthen their application for graduate study at the University of Connecticut or elsewhere. The certificate program is run in conjunction with the Doctor of Philosophy (Ph.D.) in Biomedical Science program. The areas of concentration within these degree programs are the following: Cell Analysis and Modeling, Cell Biology, Genetics and Developmental Biology, Immunology, Molecular Biology and Biochemistry, Neuroscience, and Skeletal Biology and Regeneration.

**Requirements:** The graduate certificate program conforms to the Graduate School requirements outlined in the Academic Regulations section of this catalog. The specific course of study is tailored to each student depending on their background. Students must complete a total of 12 graduate credits. Each semester, a student will enroll in MEDS 6496 for up to five credits and a one credit graduate seminar specific to their associated area of concentration. In addition, depending on individual needs, the student may enroll in one additional graduate level course each semester. All students in the certificate program must take MEDS 5310, unless the advisory committee approves an equivalent course or training experience.

### Clinical and Translational Research

The certificate program is designed to provide an introduction to clinical and translational research. The program will allow individuals to obtain the core competencies in research methods without hands on experience in mentored research. Qualified applicants include individuals who have obtained a health-related terminal degree (for example, M.D., Ph.D., Pharm.D., D.D.S., or D.M.D.). Students who do not have an established terminal degree must be accepted by the program and be in good standing in a terminal degree granting program in a health-related field.

**Requirements:** Nine credits of coursework. The required courses are outlined below. The program’s executive committee may approve substitution of a comparable graduate course(s) for CLTR 5020.

**Required Courses:** CLTR 5020, 5357, and 5359.

### Disability Studies in Public Health

This is a four-course, 12 credit certificate examining the aspects of health care, society, culture, politics, economics, legislation education and social attitudes that impact people living with disabilities. The Certificate in Disability Studies in Public Health is offered online. It is intended for individuals working in medicine, nursing, social work, law, education and public advocacy. The program requires a grade of “B” in all courses.

**Required Courses:** PUBH 5501, 5502, 5503, and 5504.

### Foundations of Public Health

This is a four-course, 12 credit certificate introducing students to the core disciplines of public health. It is intended for persons seeking to augment their knowledge and perspective with in-depth understanding of issues and opportunities in population health. The program requires a grade of “B” in all courses.

**Required Courses:** PUBH 5408 and 5409.

**Selective Courses:** Two of the following: PUBH 5403, 5404, 5405, or 5406.

## Health Psychology

Health Psychology is concerned with the application of psychological theory, methods and treatment to the understanding and promotion of physical health. Health psychology is based on the biopsychosocial model, which posits that biological, psychological and social processes are centrally and interactively involved in physical health and illness. This initially provocative premise has fueled major advances in psychology, medicine, nursing and public health and continues to contribute to increased understanding of physical health and the development of interventions promoting health and well-being.

**Requirements:** PSYC 5120. In addition, the student must also take three graduate courses (nine credits) relevant to health psychology. The Health Psychology program maintains a list of courses that are pre-approved to satisfy this latter requirement. The Director may approve other courses in addition to those that are pre-approved. Total requirements are 12 credits.

The certificate is offered by the College of Liberal Arts and Sciences and UConn Health.

## Social Determinants of Health and Disparities

The Certificate in Social Determinants of Health and Disparities (CSDH&D) is limited at the present time to University of Connecticut medical and dental students. It is intended to train 21<sup>st</sup> century physicians and dentists with skills and vision necessary to identify health disparities and develop public policies that promote health equity. The certificate provides students with both conceptual understanding and practical skills. Students enrolled in the CSDH&D complete the equivalent of four graduate level courses, totaling 12 credits, while simultaneously completing Years 1 and 2 of the School of Medicine’s MDelta curriculum (primarily through the VITAL, and CoRE course and Stage 1 experiences in Scholarship and Discovery). Subject matter focuses on principles and methods for examining the distribution and determinants of health and health care services across populations, the origins and impact of social inequality/inequity in society, and the resources and evidence-based opportunities to remedy observed disparities in health care and outcomes.

**Required Courses:** PUBH 5201, 5202, 5408, and 5409.

Medical and dental students earning the CSDH&D may apply 12 earned graduate credits as part of dual M.D./M.P.H. and D.M.D./M.P.H. program requirements.

## College of Liberal Arts and Sciences

### American Studies

As an interdisciplinary field, American Studies is devoted to studying U.S. culture and its relationship to the world beyond its borders. This certificate provides advanced training in this interdisciplinary while helping graduate students to become more capacious in their teaching and research. Working toward this certificate will provide junior scholars a space to think outside of their disciplines and to craft a genuinely multi-modal dissertation project.

**Required Courses:** AMST/HIST 6000/ENGL 6800 and AMST/HIST 6500/ENGL 6850. In addition, the student must also take two courses (six credits) listed outside of their home department or which are explicitly multidisciplinary in focus. “American Studies: Special Topics” may be counted for one of these two courses if taken a second time with a different topic. The American Studies program maintains a list of courses that are pre-approved to satisfy this latter requirement. The director may approve other courses in addition to those that are pre-approved. Total requirements are 12 credits.

### Cognitive Science

The Graduate Certificate in Cognitive Science requires a minimum of 12 credits, consisting of one required core course and three electives. Students interested in obtaining the certificate will design an individualized plan of study in consultation with their major advisors, and the Certificate advisor (Program Director). The plan of study will be submitted to the Cognitive Science Steering Committee, which will advise on the appropriateness of

the selected courses for the student's stated goals, the availability of such courses, and the preparation necessary to undertake them.

**Required Course:** COGS 5001.

**Requirements.** Three courses from the list below, including courses from at least two academic departments or divisions. Students are encouraged to have at least two courses from outside their home department/division. (NOTE: None of the courses below are offered by the Cognitive Science Program. For further information about a course or permission to enroll, please contact the offering department). Students who are candidates for both the Neurobiology of Language program and the Cognitive Science Graduate Certificate may use only one Neurobiology of Language program course to satisfy the Cognitive Science Graduate Certificate requirements.

**Anthropology:** ANTH 5306, 5332, 5335.

**Communication Science:** COMM 5500, 5501.

**Computer Science and Engineering:** CSE 5705, 5709.

**Educational Psychology:** EPSY 6550.

**Linguistics:** LING 5000, 5110, 5120, 5310, 5320, 5410, 5420, 5510, 5520, 6210.

**Philosophy:** PHIL 5317, 5331, 5342, 5344.

**Psychology:** PSYC 5140, 5251, 5285, 5302, 5303, 5410, 5420, 5440, 5450, 5470, 5512, 5513, 5514, 5515, 5541, 5553, 5554, 5564, 5567, 5568, 5569, 5570, 5571, 5572, 5574, 5575, 5583, 5616, 6733.

**Speech, Language, and Hearing Sciences:** SLHS 5342, 5343, 5348, 5349, 5376, 6370.

## Culture, Health and Human Development

The Graduate Certificate in Culture, Health and Human Development (CHHD) is administered through the Center for the Study of Culture, Health and Human Development, located in the Department of Human Development and Family Studies (HDFS), in conjunction with affiliated faculty from several departments including Psychology, Allied Health Sciences, Pediatrics, Public Health, and HDFS.

**Required Courses:** HDFS 5020 and 5030.

In addition, students must take two additional courses chosen to complement each student's particular interests and background (which may be courses that the student takes as part of their regular program or for other reasons) and complete a research study of publishable quality (which generally will be carried out in the context of HDFS 5030). CHHD projects are individually developed and supervised in consultation with the student's own major advisor and the CHHD co-directors.

## Digital Humanities and Media Studies

As an interdisciplinary field, DHMS is devoted to studying the interrelationship of digital humanities and media studies within the student's home discipline. The certificate prepares students to conduct research with digital tools by providing knowledge about same tools, about methods, and, importantly, about theoretical issues central to the numerous and rich interfaces between digital humanities and media studies. These may include text analysis, data mining, visualization, modeling and simulation, geo-spatial inquiries and mapping, multi-media or digital storytelling, information or knowledge design, network analysis, and interface design in combination with the history of media, media archeology, media aesthetics, media theory, media philosophy, electronic literature, digital cultures and game studies. The certificate as a course of study emphasizes principles and concepts that will transfer across software programs, tools, and disciplines. It also acknowledges that ever new technologies will emerge and that they are accompanied by questions about the history of technology and media in general and about how we use and integrate such technologies into our cultures and everyday practices. This certificate provides advanced training in this interdisciplinary while helping graduate students to become more capacious in their teaching and research. Working toward this certificate will provide junior scholars a space to think outside of their disciplines and to craft a genuinely multimodal dissertation project.

**Requirements:** Students must take one of the following core courses: DMD 5610; ENGL 5650; or LCL 5020.

In addition, the student must also take two courses (six credits) listed inside or outside of their home department with a focus on digital or media

studies. In order to satisfy the certificate requirement, each student will also take a three credit independent study course with a select faculty member (inside or outside the home department) for the digital project and working towards the finalization of the certificate portfolio. DHMS maintains a list of courses across campus that may satisfy the six credit requirement above. The Director, in conjunction with the student's advisor, may approve other courses in addition to those that are pre-approved. Total requirements are 12 credits.

## Feminist Studies

The Women's, Gender, and Sexuality Studies Program (WGSS) has a graduate certificate in Feminist Studies. This certificate offers a concentrated feminist perspective and interdisciplinary theoretical approach to a student's disciplinary research interests as well as a broad understanding of the field of women's, gender, and sexuality studies. The Feminist Studies Certificate can be earned by students enrolled in a UConn Graduate Degree Program, or as a stand-alone certificate for those who have completed their undergraduate degree.

**Requirements:** A minimum of 12 credits of coursework in more than one department. These credits will include three credits of feminist theory and three credits of feminist pedagogy, unless waived by the WGSS director or certificate advisor. Not including WGSS courses, no more than six credits may be taken from any single department or faculty member. No more than three credits of coursework at the 3000 or 4000 level may be counted toward the certificate. No more than three credits of WGSS 5390 (Independent Study for Graduate Students) may be counted toward the certificate. UConn Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) students must take at least three credits of coursework outside their degree-granting departments or programs.

## Geographic Information Systems

The Certificate Program is designed to recognize completion of a focused set of courses for graduate students and professionals seeking expertise in the field of Geographic Information Systems (GIS). GIS are used for integrating and analyzing spatial data. These systems, and the science behind their development and use, are the topics covered in the required coursework. The Certificate Program requires a minimum of 12 credits.

**Required Courses:** GEOG 5500 and 5510; plus additional courses in Geography or a related field taken at the graduate 5000 or 6000 level.

A student's program of study for the certificate may include only one completion of GEOG 5810. Students develop a program of study with the assistance and approval of the Certificate Program Coordinator. Students must pass all courses with a grade of "B" or better and have an overall grade point average for the 12 credits of 3.0 or greater. All coursework for the certificate must be completed at the University of Connecticut.

## Health Psychology

Health Psychology is concerned with the application of psychological theory, methods and treatment to the understanding and promotion of physical health. Health psychology is based on the biopsychosocial model, which posits that biological, psychological and social processes are centrally and interactively involved in physical health and illness. This initially provocative premise has fueled major advances in psychology, medicine, nursing and public health and continues to contribute to increased understanding of physical health and the development of interventions promoting health and well-being.

**Requirements:** PSYC 5120. In addition, the student must also take three graduate courses (nine credits) relevant to health psychology. The Health Psychology program maintains a list of courses that are pre-approved to satisfy this latter requirement. The Director may approve other courses in addition to those that are pre-approved. Total requirements are 12 credits.

The certificate is offered by the College of Liberal Arts and Sciences and UConn Health.

## Human Rights

The graduate certificate in Human Rights offers graduate students the opportunity to develop a competency in human rights theory and practice while being able to craft a course of study directly relating to their specific interests and needs. The certificate provides historical, literary,

and philosophical perspectives for thinking broadly about modern human rights; an understanding of social science research on rights, conflict, and governance; as well as expertise in international treaties, institutions, and case law. The certificate is open to students who are currently matriculated in a graduate level program at the University of Connecticut, including the College of Liberal Arts and Sciences, School of Education, School of Law, and School of Social Work. Students must complete 12 credits, consisting of at least one core course and three elective courses. Courses may be taken at the College of Liberal Arts and Sciences, the School of Education, the School of Social Work, or the Law School. A maximum of three credits of independent study can be applied towards the certificate course requirements. Students may also petition for the inclusion of other courses on a case-by-case basis. Departmental Special Topics and Variable Topics courses (\*), maybe taken with pre-approval of content by the Human Rights Graduate Certificate Committee. HRTS 5899 Seminar in Variable Topics in Human Rights may be repeated with a change in content.

**Core Courses:** HRTS 5301; LAW 7878; or SWEL 5385.

**Preapproved Electives:** College of Liberal Arts and Sciences: ANTH 5305\*, 5315; ANTH 5377/PH 5497; ANTH 5390, 5391; BLAW/BADM 5254; CLCS 5317\*; ECON, 5473, 6473; ECON 5128/HRTS 5390; ENGL 6540; GERM 6480\*; GERM 5314\* /CLCS 5317; GEOG 5810; HIST 5195, 5622; HRTS 5095, 5499, 5899\*; LLAS 5105\*; PHIL 5315; POLS 5010\*, 5115, 5322; SOCI 5515, 5801, 5806, 5895\*, 5896; SPAN 6402\*; WGSS 5398. School of Education: EDCI 5094. School of Social Work: SWEL 5317, 5318, 5345, 5348, 5350, 5360, 5375. Law School: LAW 7386, 7558, 7592, 7609 (only open to law students; only four credit classroom component counts towards certificate), LAW 7653, 7655, 7672, 7679, 7695, 7755, 7759, 7814, 7815, 7831, 7838, 7872, 7876, 7883, 7914, 7927\*; LAW 7942/PUBH 5463.

The certificate is offered by the College of Liberal Arts and Sciences, the Neag School of Education, and the School of Social Work.

### Intraoperative Neuromonitoring

The Department of Physiology and Neurobiology offers a Graduate Certificate Program in Intraoperative Neuromonitoring (IONM). This program is a six-week, nine-credit summer program that is designed to prepare students for a career in the field of intraoperative neuromonitoring. Upon successful completion of the IONM program, an individual can join the field of intraoperative neuromonitoring as a neuromonitoring technologist that offers jobs in the operating room environment.

**Required Courses:** PNB 5101, 5102, and 5103.

### Leadership and Public Management

The Department of Public Policy offers a 12 credit graduate certificate in Leadership and Public Management (LPM). This certificate gives students the opportunity to build their management capacity. The LPM Certificate requires four courses. Certificate students and their advisors decide the most appropriate course of study.

### Logic

Logic is a multifaceted subject that connects many disciplines, including mathematics, computer science, philosophy, linguistics, and other areas. The certificate facilitates advanced studies in a variety of topics, including: mathematical logic; the theory of computation; formal semantics; natural-language reasoning; vagueness, probability, and contradiction; and the application of logic and formal methods to law and cognitive science. Administered through the UConn Logic Group, which is an internationally recognized center of logic research excellence, the certificate will provide students with a broad and comprehensive background in the subject, with a specific focus on interdisciplinary applications.

**Required Course:** Students are required to take a one credit independent study with a Certificate Director, which includes participation in the Logic Colloquium for at least one semester.

**Elective Courses:** Four courses from among CSE 5102, 5506; LING 5410, 5420, 6410, 6420; MATH 5026, 5260; PHIL 5307, 5311, 5344. At least two of the completed courses must be from different departments. Courses not listed here may be included by approval of Certificate Directors. Total course requirement is 12 credits.

### Neurobiology of Language

Faculty affiliated with the Cognitive Science program and the graduate training program in Neurobiology of Language offer a Graduate Certificate in Neurobiology of Language. The required four courses, listed below, provide background in neurodevelopment and linguistic structure and processing, followed by courses that integrate cognitive and biological approaches to understanding typical and atypical language throughout the lifespan, totaling a minimum of 12 credits.

**Required Courses:** COGS 5120, 5130, 5140, and 5150.

### Nonprofit Management

The Online Graduate Certificate in Nonprofit Management, administered by the Department of Public Policy, focuses on a core set of skills needed by leaders in the nonprofit sector. The Nonprofit Management Certificate requires 12 credits of course work.

**Required Courses:** PP 5319, 5323, 5324, and 5328.

### Occupational Health Psychology

Occupational Health Psychology (OHP) involves the interdisciplinary partnerships of psychological and occupational health science professionals seeking to improve the quality of working life, and enhance the safety, health and well-being of workers in all occupations. Because it exists at the intersection of behavioral science and occupational health disciplines, OHP is inclusive of knowledge and methods from psychology, public/occupational health, organizational studies, human factors, and allied fields (such as occupational sociology, industrial engineering, economics, and others). OHP is concerned with the broad range of exposures and mechanisms that affect the quality of working life and the responses of workers. These include individual psychological attributes, job content and work organization, organizational policies and practices, and the economic and political environments in which organizations function. OHP research and practice explores interventions targeting the work environment as well as the individual, to create healthier workplaces and organizations and to improve the capacity of workers to protect their safety and health and to maximize their overall effectiveness. The certificate program follows a scientist-practitioner model of training with an emphasis on research. Coursework includes an introductory OHP proseminar, an epidemiology course, supervised field or lab research in occupational safety and health, plus elective courses in occupational safety and health such as ergonomics and organizational stress.

**Required Common Core Course:** PSYC 5123.

**One Required Field/Lab OHP Research Experience:** GRAD 5950, 5960, 6950, 6960; or PSYC 5800.

**Required Methodology Course:** PUBH 5497 when taught as Intermediate Epidemiology.

**Elective Specialization Seminars (two required – one outside primary discipline):** BME 5339; PSYC 5670 when taught as Organizational Stress or Work and Aging; PSYC 5120, 5617; PUBH 5497 when taught as Introductory Ergonomics and Exposure Assessment, Occupational and Environmental Health Policy, or Health in the Built Environment; or PUBH 6493.

### Public Financial Management

The Graduate Certificate in Public Financial Management (PFM), offered through the Department of Public Policy, prepares professionals for leadership positions in the finance and budget areas of public and nonprofit organizations. The four course PFM Certificate is comprised of 12 credits of coursework. Certificate students and their advisors decide the most appropriate course of study.

### Quantitative Research Methods

The program in Quantitative Research Methods (QRM) is a graduate certificate program administered by faculty in the Departments of Psychological Sciences, Sociology, and Educational Psychology, but drawing students from many other departments and schools. The general

structure and policies of this program follow the guidelines for graduate certificate programs specified in the UConn Graduate Catalog. The program's mission is to provide students with a thorough background in quantitative research methods in the psychological sciences that extends the basic research methods training required by their respective graduate programs. Students interested in the program design an individualized plan of study, in consultation with their major advisor, which serves their research needs, interests, and career goals.

**Prerequisite Course Requirements:** PSYC 5104 and 5105 or equivalent courses. Students who wish to substitute equivalent coursework for these two courses with other graduate level introductory statistics courses need to submit a petition to the Director of the QRM program.

**Credit Requirement:** Participants in the program complete 12 credits of graduate coursework in quantitative methods. The 12 credits are selected from: AH 6005; EPSY 6611, 6615, 6637, 6651; HDFS 5095 when taught as Longitudinal Methods, Meta Analysis, or other topic approved by the Program Director; MGMT 6206; PSYC 5131, 5332, 5470, 5554, 5670 when taught as Multivariate Approaches to Survey Data; PSYC 5701, 5702, 6130; PUBH 5434 or 5435; SOCI 5203; STAT 3375Q or 5825.

Additional courses are acceptable with prior approval. Students who wish to petition for a course that is not listed may do so by submitting a petition with sufficient documentation of the content of the course to the QRM Director (syllabus, exam examples). Such courses cannot be from other institutions.

**QRM Presentation:** Participants in the QRM program must pass a formal presentation to a QRM committee. The presentation will typically be done in the final year of study, after or near the completion of elective courses.

## Race, Ethnicity, and Politics

Historically, it has been under the framework of Race, Ethnicity, and Politics (REP) that scholars in Political Science have explored the relationship of social identities and persistent inequalities to the nature of domestic and international politics. REP scholars have, in the main, contended that doing their work rigorously requires drawing on diverse methods that combine in transdisciplinary endeavors. The Graduate Certificate offers mentorship to graduate students seeking to pursue REP questions and research agendas by enabling them to join a community of interlocutors, including peers and faculty from across the university, that nurtures the cross-pollination of ideas and networks necessary to support the advancement of this kind of inquiry.

**Requirements:** Students are required to complete four pre-approved three-credit courses with significant REP content, earning a grade of "B" or higher in each. At least two, but no more than three, of the 5000/6000-level graduate seminars must be completed in Political Science. One of the four courses must have a U.S. focus, which means that at least three-quarters of course readings and discussion will deal with questions of race, ethnicity, and politics as explored in the U.S. context. One of the graduate seminars must be international or global in scope, which means that at least three-quarters of course readings and discussion will deal with race, ethnicity, and politics as explored in an international or global context. To determine whether a particular course satisfies requirements, students selecting classes should consult with the REP Graduate Certificate program director.

**Pre-approved Courses:** AMST 6000; EDCI 5875, 5830; ENGL 5530, 6400, 6450, 6540; GEOG 5840; GERM 6480; HIST 5235, 5525, 5543, 5565, 5610, 5622, 5630; LAW 7529, 7655, 7703, 7810; LLAS 5105, 5610; PHIL 5310; POLS 5105, 5409, 5410; PSYC 6750, 5170, 5370; SOCI 5501; SWEL 5377, 5385. The Graduate Certificate program director may approve other courses in addition to those that are preapproved. Finally, all students enrolled in the certificate program are expected to participate in one reading group session in which all core Political Science faculty and enrolled students read and discuss one non-course book of relevance to REP. REP Graduate Certificate students must also participate in one UConn-based graduate student conference, sharing research undertaken in one of their REP courses.

## Survey Research

The Online Graduate Certificate in Survey Research, which is offered by the Department of Public Policy, prepares students to use survey research in their careers. The certificate is comprised of four courses, totaling 12 credits. The certificate courses can be applied to the Master of Arts in

Survey Research provided the student makes the decision to apply to the Master's degree program prior to having the certificate awarded. The following courses are recommended for completion of the graduate certificate. Graduate certificate students and their advisors decide the most appropriate course of study.

**Required Courses:** PP 5379 and three of the following: PP 5322, 5332, 5376, 5377, 5382, 5383, 5384, 5385,\* 5387, or 5397.

\*Recommended course for students who do not have professional survey research experience.

# Neag School of Education

## College Instruction

Effective teaching in undergraduate and graduate classrooms is becoming an increasingly important consideration in hiring faculty. The Graduate Certificate in College Instruction (GCCCI) is intended for students interested in deepening their theoretical and practical understanding of college teaching and in preparing for employment in higher education. The certificate provides learners the foundations of higher education pedagogy, opportunities to develop a teaching philosophy and approach, and an exploration of a variety of instructional techniques and classroom management strategies in college settings.

**Required Courses:** Students with instructional experience must complete GRAD 6000 and 6001. Students without instructional experience must complete: GRAD 6000, 6001 and 6004. In addition, all students must take a minimum of six elective credits which explicitly focus on some aspect of instruction in higher education. The GCCCI Program maintains a list of courses that are preapproved to satisfy this latter requirement. The Director may approve other courses in addition to those that are preapproved. In general, electives applied to another plan of study (Master of Arts or Doctor of Philosophy) cannot be used for the GCCCI.

## Executive Leadership Program

The Department of Educational Leadership offers the Executive Leadership Program (ELP), which is designed to provide aspiring individuals outstanding preparation for assuming a school superintendency and other central office positions. This cohort-based program is completed within 12-13 months and meets on dates designed to accommodate working professionals. This is a non-degree program that leads to endorsement for the Connecticut 093 (superintendency) certificate. Selected courses are eligible for transfer to UConn's Doctor of Education (Ed.D.) program with the approval of the student's advisory committee.

**Required Courses:** Students must complete the following five three-credit courses, which include a two-semester internship with an experienced ELP Mentor Superintendent: EDLR 6301, 6302, 6303, 6304, and 6092 (both semesters).

## Gifted Education and Talent Development

The graduate certificate in Gifted Education and Talent Development is a 12 credit program intended for educators and others interested in supporting talented development in young people. The program can be completed in one year through a series of four online courses. The graduate certificate requires successful completion of four three-credit courses, including three required courses and one elective.

**Required Courses:** EPSY 5710, 5720, 5740; and at least one elective course: EPSY 5750, 5760, or 5780.

## Human Rights

The graduate certificate in Human Rights offers graduate students the opportunity to develop a competency in human rights theory and practice while being able to craft a course of study directly relating to their specific interests and needs. The certificate provides historical, literary, and philosophical perspectives for thinking broadly about modern human rights; an understanding of social science research on rights, conflict, and governance; as well as expertise in international treaties, institutions, and case law. The certificate is open to students who are currently matriculated in a graduate level program at the University of Connecticut, including the College of Liberal Arts and Sciences, School of Education, School

of Law, and School of Social Work. Students must complete 12 credits, consisting of at least one core course and three elective courses. Courses may be taken at the College of Liberal Arts and Sciences, the School of Education, the School of Social Work, or the Law School. A maximum of three credits of independent study can be applied towards the certificate course requirements. Students may also petition for the inclusion of other courses on a case-by-case basis. Departmental Special Topics and Variable Topics courses (\*), maybe taken with pre-approval of content by the Human Rights Graduate Certificate Committee. HRTS 5899 Seminar in Variable Topics in Human Rights may be repeated with a change in content.

**Core Courses:** HRTS 5301; LAW 7878; or SWEL 5385.

**Preapproved Electives:** College of Liberal Arts and Sciences: ANTH 5305\*, 5315; ANTH 5377/PH 5497; ANTH 5390, 5391; BLAW/BADM 5254; CLCS 5317\*; ECON, 5473, 6473; ECON 5128/HRTS 5390; ENGL 6540; GERM 6480\*; GERM 5314\* /CLCS 5317; GEOG 5810; HIST 5195, 5622; HRTS 5095, 5499, 5899\*; LLAS 5105\*; PHIL 5315; POLS 5010\*, 5115, 5322; SOCI 5515, 5801, 5806, 5895\*, 5896; SPAN 6402\*; WGSS 5398. School of Education: EDCI 5094. School of Social Work: SWEL 5317, 5318, 5345, 5348, 5350, 5360, 5375. Law School: LAW 7386, 7558, 7592, 7609 (only open to law students; only four credit classroom component counts towards certificate), LAW 7653, 7655, 7672, 7679, 7695, 7755, 7759, 7814, 7815, 7831, 7838, 7872, 7876, 7883, 7914, 7927\*; LAW 7942/PUBH 5463.

The certificate is offered by the College of Liberal Arts and Sciences, the Neag School of Education, and the School of Social Work.

### Leadership and Diversity in Sport Management

This is a 12 credit online graduate certificate program that provides students with an in-depth understanding of the process of leadership within a sport context and helps them to develop the leadership skills needed to manage a diverse workforce in sport organizations. Students are immersed in the process of leadership (including theory and practice), engage in the development of diversity management practices, and work with faculty at the University of Connecticut who have leadership and diversity management expertise. This program will also link students with recognized leaders in the field and provide hands-on projects to help them enhance their leadership skills, with a focus on leading a diverse workforce.

**Required Courses:** EDLR 5360, 5365, 5370, and 5375.

### Literacy Supports

This 12 credit certificate program in Literacy Supports for students with and at-risk for learning disabilities provides in-depth learning and experiences in theory and methods of literacy (reading and writing) instruction. Students will have specialized knowledge in literacy assessment and instruction for preK-12 students who exhibit difficulties acquiring and developing literacy skills. The Literacy Supports specialization is for educators who: are interested in improving literacy outcomes for students with disabilities and at-risk for failure; want to support all students in a variety of classroom settings within an RtI or SRBI framework; want to understand how to support the literacy needs of students in content areas; desire a more focused and intensive exploration and application of literacy theory, methods, and practices for students with disabilities and at risk for learning difficulties, and recognize the diverse learning needs of students in today's classrooms.

**Required Courses:** EPSY 5092 and three courses from ESPY 5113, 5114, 5115 or 5123.

### Postsecondary Disability Services

The Postsecondary Disability Services (PDS) certificate program is a four course (12 credit) graduate certificate offered entirely online. It targets working educational professionals who are seeking a job in higher education disability services, specifically, student affairs generalists, special education teachers, school psychologists, school social workers, and transition coordinators.

**Required Courses:** EPSY 5092, 5140, 5145, and 5199.

## Program Evaluation

The Department of Educational Psychology (EPSY) offers a Graduate Certificate in Program Evaluation. There are two modalities in which this certificate program is offered: online and face-to-face. The face-to-face program is designed for current University of Connecticut graduate students who wish to acquire foundational skills and knowledge in the area of program evaluation, while the online program is designed for working professionals with those interests. The certificate is earned through coursework, including a required practicum. Certificate students must complete 12 credits. Students must maintain a GPA of 3.0 or higher in each required course.

**Required Core Courses:** EPSY 5195, 6601, 6621, and 6623.

**Required Practicum:** EPSY 5195; which requires that students work collaboratively with faculty to integrate their course experiences into actual evaluation practice. Current issues in the field may be discussed. Activities are tailored to the skills and needs necessary to complete work on students' selected evaluation projects.

### School Law

This is a 12 credit online graduate certificate program for K-12 Professionals that cuts through the legalese to help educators, administrators, and policymakers understand the dimensions of K-12 education. Students acquire the knowledge and skills to ensure that educational practices in the classroom, school, or district comply with state (generally applicable to all states) and federal statutes and regulations and case law.

**Required Courses:** EDLR 6001, 6002, 6004; and EPSY 5119.

### School-wide Positive Behavior Support

The graduate certificate program in School-wide Positive Behavior Support (SWPBS) is designed for students who have education, experience, or both in Special Education or a related area of study; are pursuing advanced degrees in Special Education or a related area of study or wish to gain additional knowledge through continuing education; desire to gain an in-depth knowledge of Applied Behavior Analysis (ABA), the empirical basis for SWPBS; and commit to applying evidence-based practices in positive behavior interventions and supports in their future work. Students may apply for the Graduate Certificate in SWPBS along with their application to an advanced degree program (i.e., Master of Arts, 6th Year, or Doctor of Philosophy) in Special Education or a related area of study; upon acceptance into an advanced degree program in Special Education or a related area of study; as a non-degree student interested in gaining additional knowledge in SWPBS; or after completing the initial course in the sequence (i.e., EPSY 5141).

**Required Courses:** EPSY 3125, 5092, 5141, 5142, and 5405, offered in four consecutive semesters. In addition, students are required to complete activities to demonstrate mastery of competencies in the area of SWPBS.

### Special Education Transition to Adulthood

The Special Education (SPED) Transition certificate program is a four course (12 credit) graduate certificate offered entirely online. It targets working educational professionals, specifically, special education teachers, school psychologists, school social workers, and transition coordinators.

**Required Courses:** EPSY 5119, 5140, 5146, and 5094.

## School of Nursing

### Health Professions Education

This is a nine credit online certificate program designed for health educators addressing planning, implementation and evaluation of health professions coursework. All participants must have a master's degree or higher to apply.

**Required Courses:** NURS 5700, 5710, and 5720.

### Holistic Nursing

This is a nine credit hybrid certificate program designed for nurses interested in holistic health. All participants must have a master's degree or higher to apply or be consented by the instructors of record.

**Required Courses:** NURS 5001, 5002, and 5003.

### Nursing Practice

The School of Nursing offers Post-Master's Certificates in Nursing Practice in the following areas: Adult Gerontology Acute Care, Adult Gerontology Primary Care, and Neonatal Care. These certificates are appropriate for master's prepared nurses who wish to pursue graduate level study in a track different from their Master of Science (M.S.) degree. The programs consist of master's level practicum courses and their associated theory courses. Faculty coordinators may require additional coursework on an individual basis.

#### Nursing Practice: Adult Gerontology Acute Care Nurse Practitioner (AGACNP)

Post-Master's Certificate graduates are prepared as advance practice nurses to assess, diagnose, monitor, treat and coordinate care of acutely and critically ill individuals from adolescence to senescence. The core competencies emphasize teaching/coaching, consultation and evidence-based practice. The focus of the role is to provide services ranging from disease prevention to critical care to stabilize the patient's condition, prevent complications, restore maximum health and/or provide palliative care. The AGACNP practice focuses on patients who are characterized as "physiologically unstable, technologically dependent, and/or are highly vulnerable to complications" (American Association of Colleges of Nursing, 2012). Graduates of this concentration are prepared to apply for eligibility to take the AGACNP certification examination prepared by an approved national organization as accepted by the Board of Registration in Nursing and apply to practice in the expanded role in Connecticut or other states based on regulatory guidelines.

**Required Courses:** NURS 5060, 5062, 5070, 5150, 5160, 5169, 5170, 5179, 5400, and 5409.

#### Nursing Practice: Adult Gerontology Primary Care Nurse Practitioner (AGPCNP)

Post-Master's Certificate graduates are prepared as advance practice nurses to assess, diagnose, monitor, treat and coordinate care of individuals from adolescence to senescence with common acute and chronic conditions within the context of family and community. The focus of the role is on the delivery of primary care to the individual including health promotion, disease prevention, and disease management activities to support healthy lives. The core competencies emphasize teaching/coaching, consultation and evidence based practice. Graduates of this track are prepared to apply for eligibility to take the AGNP Primary Care certification examination prepared by an approved national organization as accepted by the Board of Registration in Nursing and apply to practice in the expanded role in Connecticut or other states based on regulatory guidelines.

**Required Courses:** NURS 5060, 5062, 5070, 5150, 5400, 5409, 5410, 5419, 5420, and 5429.

#### Nursing Practice: Neonatal Nurse Practitioner (NNP)

Advanced practice roles in neonatology are among the oldest and most respected of all advanced practice roles in the U.S. Educational preparation as a neonatal nurse practitioner (NNP) provides experienced neonatal nurses with an increased opportunity to make significant contributions to patient care and to influence neonatal population outcomes. Graduates of the NNP Program assume leadership roles guiding patient management plans in neonatal intensive care units, level II special care nurseries, and well-baby nurseries, among other settings. Graduates are prepared to apply for eligibility to take the Neonatal Nurse Practitioner examination given by the National Certification Corporation.

**Required Courses:** NURS 5350, 5362, 5365, 5370, 5369, 5375, 5379, 5385, and 5389.

The required coursework for the above three post masters certificates are the core courses (if not completed in original master's program) and the related track specific courses.

### Pain Management

This is a 12 credit online certificate program designed for those interested in the science of pain management. It is intended for researchers, clinicians and educators. All participants must have a master's degree or higher to apply or be consented by the instructors of record.

**Required Courses:** NURS 5101, 5102, 5103, and 5104.

## School of Social Work

### Human Rights

The graduate certificate in Human Rights offers graduate students the opportunity to develop a competency in human rights theory and practice while being able to craft a course of study directly relating to their specific interests and needs. The certificate provides historical, literary, and philosophical perspectives for thinking broadly about modern human rights; an understanding of social science research on rights, conflict, and governance; as well as expertise in international treaties, institutions, and case law. The certificate is open to students who are currently matriculated in a graduate level program at the University of Connecticut, including the College of Liberal Arts and Sciences, School of Education, School of Law, and School of Social Work. Students must complete 12 credits, consisting of at least one core course and three elective courses. Courses may be taken at the College of Liberal Arts and Sciences, the School of Education, the School of Social Work, or the Law School. A maximum of three credits of independent study can be applied towards the certificate course requirements. Students may also petition for the inclusion of other courses on a case-by-case basis. Departmental Special Topics and Variable Topics courses (\*), maybe taken with pre-approval of content by the Human Rights Graduate Certificate Committee. HRTS 5899 Seminar in Variable Topics in Human Rights may be repeated with a change in content.

**Core Courses:** HRTS 5301; LAW 7878; or SWEL 5385.

**Preapproved Electives:** College of Liberal Arts and Sciences: ANTH 5305\*, 5315; ANTH 5377/PH 5497; ANTH 5390, 5391; BLAW/BADM 5254; CLCS 5317\*; ECON, 5473, 6473; ECON 5128/HRTS 5390; ENGL 6540; GERM 6480\*; GERM 5314\* /CLCS 5317; GEOG 5810; HIST 5195, 5622; HRTS 5095, 5499, 5899\*; LLAS 5105\*; PHIL 5315; POLS 5010\*, 5115, 5322; SOCI 5515, 5801, 5806, 5895\*, 5896; SPAN 6402\*; WGSS 5398. School of Education: EDCI 5094. School of Social Work: SWEL 5317, 5318, 5345, 5348, 5350, 5360, 5375. Law School: LAW 7386, 7558, 7592, 7609 (only open to law students; only four credit classroom component counts towards certificate), LAW 7653, 7655, 7672, 7679, 7695, 7755, 7759, 7814, 7815, 7831, 7838, 7872, 7876, 7883, 7914, 7927\*; LAW 7942/PUBH 5463.

The certificate is offered by the College of Liberal Arts and Sciences, the Neag School of Education, and the School of Social Work.

# Course Descriptions

## Course Offerings

The following lists include most of the graduate courses that the University has approved for offering. However, not all courses listed are offered every semester or every year. For actual current offerings, students should consult the appropriate schedule of classes which can be accessed from the Graduate School's registration website. Descriptions of undergraduate courses are contained in the Undergraduate Catalog. The University reserves the right to change announced offerings.

## Course Numbering System

Undergraduate courses are numbered 1000-4999. Courses numbered 1000-1999 are primarily for freshmen, courses numbered 2000-2999 are primarily for sophomores, courses numbered 3000-3999 are primarily for juniors, and courses numbered 4000-4999 are primarily for seniors. A limited number of credits of coursework completed at the 4000-level (usually not more than six) may be applied, with the approval of the student's advisory committee, toward a graduate degree program provided certain conditions are met (See "Academic Regulations"). Graduate courses are numbered 5000-6999. This Catalog contains listings of graduate-level courses only. Courses numbered 5000-5999 are primarily for master's degree students, and courses numbered 6000-6999 are primarily for doctoral students.

## Course Semesters

Class schedules for each semester and session can be accessed from the University's PeopleSoft website. Not all courses are offered every semester or every year. Information concerning the availability of particular courses may be obtained also from departmental and program offices. Courses carrying hyphenated numbers are full-year courses extending over two semesters. The first semester of such courses is always prerequisite to the second, but the student may receive credit for the first semester without continuing with the second.

## Course Meeting Times

Information about the specific time(s) that a course will meet may be obtained from the appropriate departmental office at the time of registration or from appropriate class schedules.

## Course Prerequisites

All course prerequisites must be met before a student is permitted to register for the particular course. If, however, the instructor of a course is convinced that the student has the equivalent of such a prerequisite, the instructor may admit the student by providing the student with a unique PeopleSoft permission number (which is valid only for that student to use in registering for the course in question).

## Course Instructor

Students should consult the schedule of classes contained in the PeopleSoft database or contact the departmental office at the time of registration to obtain information concerning course instructor(s).

## Accounting (ACCT)

### 5121. Financial Accounting and Reporting

Three credits. Prerequisite: Open only to MBA students. Not open to students who have passed ACCT 5182.

Introduces students to accounting concepts essential to the preparation and interpretation of financial statements issued to management and to external users such as stockholders and creditors. While appropriate consideration is given to procedural aspects of accounting, more emphasis is placed on understanding the conceptual bases of generally accepted accounting principles and the effects of using alternative accounting methods on financial statements.

### 5122. Financial Reporting I

Three credits. Prerequisite: A grade of B- or better in ACCT 2001 and 2101; ACCT 5121 and 5123.

An intensive study of financial accounting theory and practical applications as related to the preparation and analysis of financial statements, particularly focusing on assets, liabilities, owner's equity and income determination.

### 5123. Cost Analysis and Control

Three credits. Prerequisite: ACCT 5121; open only to MBA students. Not open for credit to students who have passed ACCT 5184.

Managerial uses of accounting information for decision-making within the business enterprise. Decisions considered include product pricing, transfer pricing, make or buy, and capital budgeting. Formation of budgets establishing an internal control structure, performance evaluation, and cost control techniques are also discussed.

### 5124. Financial Reporting II

Three credits. Prerequisite: A B- or better in ACCT 5122.

Continuation of an intensive study of financial accounting theory and practical applications as it relates to the preparation and analysis of financial statements, particularly focusing on pensions, bonds, leases, and intangibles. Also covered are accounting for consolidations, intercompany transfers, and multinational accounting.

### 5181. Financial Accounting and Reporting-Fundamentals

1.5 credits. Prerequisite: Open only to MBA students. Not open for credit to students who have passed BLAW 5182.

In order to make effective decisions, managers must be able to understand, analyze and evaluate financial statement data regarding the outcomes of previous decisions. Oriented towards "users" (versus "preparers") of financial statements and aims to help students develop a basic understanding of the financial accounting concepts and procedures that underlie corporate financial statements. The course objective is to provide students with a fundamental understanding of accounting methods and terminology so that the financial statements in corporate annual reports can be analyzed and evaluated.

### 5182. Financial Accounting and Reporting-Applications

1.5 credits. Corequisite: ACCT 5181.

Financial accounting for certain, specific economic transactions (e.g., debt issuance, granting

stock-based compensation). Provides students with an introduction to fundamental finance concepts and, in turn, a more nuanced understanding of the financial accounting concepts and procedures that underlie corporate financial statements.

### 5183. Cost Analysis

1.5 credits. Prerequisite: ACCT 5182.

This course provides a micro level understanding of various costing systems, e.g. job-order costing, process costing, and activity-based costing. Students comprehend the nature and behavior of cost and how cost is directly affected by resource (people, materials and capital) acquisition and allocation decisions. Students explore how management solves the interrelated problems of efficiency, productivity, and pricing.

### 5184. Managerial Controls

1.5 credits. Prerequisite: ACCT 5183.

This course takes a macro perspective of applying cost concepts to real-world managerial scenarios to make rational decisions, e.g. product pricing, transfer pricing, make or buy, performance measurement, and budgeting. Students explore how management solves the interrelated problems of capacity, sourcing, pricing, and profitability.

### 5243. Assurance Services

Three credits. Prerequisite: A B- or better in ACCT 2001 and 2101; or ACCT 5121 and 5123 or 5122.

An in-depth study of issues relevant to the public accounting profession, including legal liability and ethics, audit risk analysis, planning of audit engagements, auditor reports, and other assurance services and reports. Students will learn to think critically about issues facing the accounting profession primarily by analyzing cases and completing a number of individual and group research projects.

### 5260. Federal Income Taxation

Three credits. Prerequisite: A B- or better in ACCT 2001; ACCT 5121 or equivalent at an accredited U.S. university.

A study of the fundamentals of Federal income taxation for individuals and related issues of compliance, reporting, and planning. Focuses on income and deduction recognition, character, and timing and includes the tax treatment of property, investments, compensation, retirement, and estates.

### 5327. Financial Statement Analysis and Business Valuation

Three credits. Prerequisite: ACCT 5121 or 5182; open only to MBA students.

Addresses the use of financial statements to analyze and value firms. Topics include advanced issues in accounting, earnings quality, performance measurement, cash flows, and accounting-based valuation and trading strategies.

### 5505. Understanding the Responsibilities of an Accounting Professional

Three credits. Prerequisite: Open only to Accounting M.S. students. Instructor consent required.

The groundwork for fundamental issues that are included in the curriculum in the M.S. in Accounting Program relating to content and skills associated with professional success will be set.

**5520. Financial Planning for Accounting Professionals**

Three credits. Prerequisite: ACCT 5571. ACCT 5572 preferred but not required.

Designed for the accounting professional in the role of financial planner, this course covers all facets of a professional in financial planning practice. Topics include personal income tax planning, debt management, investment and retirement planning, risk management and insurance, and estate planning.

**5531. Contemporary Financial Accounting Issues**

Three credits.

Study of major financial accounting issues, including the conceptual framework of accounting, the standard-setting process, asset valuation, income determination, and the agency theoretic perspective on managerial behavior and the use of accounting information in contracts. Other topics covered are fair value and derivatives accounting, and corporate governance issues related to the Sarbanes-Oxley Act of 2002. Concentrates on developing theories of the usefulness of accounting information in financial markets. This theoretical perspective is used to evaluate the conceptual framework, specific accounting standards, and issues related to international harmonization of accounting standards.

**5532. Contemporary Issues in Financial Reporting and Analysis**

Three credits. Prerequisite: Open only to Accounting M.S. students.

Focuses on major financial reporting issues in consideration of the current data-centric technological and analytical environment. Broad topics are derived from FASB's conceptual framework, including income determination and asset valuation. Specific topics covered include risk management, earnings management, firm valuation, investing, and corporate governance issues. Introduces tools that link non-financial metrics with financial reports, providing actionable insights for external decision makers.

**5533. Contemporary Managerial Accounting Issues**

Three credits.

Study of major managerial accounting issues including analysis and evaluation of cost management systems. Overall focus is on the use of internally generated accounting data to support business strategy and maintain competitive advantages. Current research in the constantly evolving area of managerial accounting is emphasized.

**5535. Global Financial Reporting and Analysis**

Three credits.

Students will develop and test expectations about the content of financial reports based on an understanding of how national culture and subcultures affect financial reporting in a principles-based decision environment.

**5539. Financial Services Reporting & Analysis in the Financial Services Industry**

Three credits.

Introduces the nature of and accounting for financial services firms. The major emphasis is on insurance and banking. In each section of the course the student will learn about the nature of

the business and the basic transactions in which the business engages. The unique accounting aspects of the businesses are discussed, including any special regulatory accounting rules. The analysis of firms in the industry will be covered.

**5543. Advanced Assurance Services**

Three credits.

Advanced treatment of significant assurance services issues. Intended for students with previous coursework in assurance services and/or auditing. The course demonstrates more detailed level of audit techniques: audit planning, risk analysis, assessing internal control, executing audit procedures to substantiate validity of key financial accounts, and a presenting the audit findings in a final audit report.

**5545. Business Law, Business Ethics, and Public Accounting**

Three credits. Not open only to MBA students, who should instead take BLAW 5175. Instructor consent required.

Covers the major legal and ethical issues in business and their significance for the accounting profession and related stakeholders. Included among the topics are the tension between profit and the public interest, corporate responsibility to society, environmental concerns, consumer and employee relations, confidentiality, whistle blowing, advertising and hiring practices.

**5546. Forensic Accounting and Fraud Examination**

Three credits. Prerequisite: Instructor consent.

Develops a foundation upon which forensic accounting engagements are performed. Highlighting the many contexts within which forensic accounting can be performed, students learn the roles forensic accountants play within a wide range of engagements. Students will build their forensic accounting mindset and skill set through the readings and interactions with the professor, while working on a forensic accounting engagement from inception through successful resolution.

**5549. Accounting and Disclosure for Not for Profit Entities**

Three credits. Prerequisite: Instructor consent.

Accounting for not-for-profit organizations (NFPs), including educational institutions, hospitals and other health care entities, and civic and cultural organizations, is substantially different than for-profit entities. Examines topics relating to preparing and using financial statements for NFPs, including accounting, audit, and disclosure requirements and selected issues relating to government grants awarded to NFPs.

**5553. Evaluating Internal Controls**

Three credits. Prerequisite: Instructor consent.

Examines frameworks for evaluating the control practices that an organization relies on to help ensure the integrity of information provided by its accounting systems. Students will learn how to: (1) analyze an organization's control environment and processes to assess information integrity risks that can be managed with control procedures; (2) design, implement, and monitor internal controls for both manual processing procedures and information-technology-intensive accounting systems; and (3) test the effectiveness of controls

in order to evaluate the extent to which deficiencies threaten the reliability of accounting information.

**5554. Introduction to Data Analytics for Accountants**

Three credits.

Introduction to the skills and technologies used to analyze data with an emphasis on preparing accountants to interact with data scientists and others. The role of data analysis in the accounting profession will be explored.

**5555. Advanced Data Analytics for Accountants**

Three credits.

Introduces more advanced techniques such as combining multiple data sources and non-linear models. Additional techniques for preparing data and dealing with data anomalies are explored and practiced. This is a technical, hands-on course.

**5557. Advanced Accounting Information Systems**

Three credits.

An overview of Accounting Information Systems with emphasis on business process analysis, data modeling, business analytics, and internal controls. Highlights emerging trends in data analytics and its growing impact in accounting. Students work directly with various software tools to learn relational database design, data retrieval, and analysis. Introduces principles of Big Data, data visualization and software for fraud detection and internal controls.

**5559. Accounting and Auditing for Governmental Entities**

Three credits. Prerequisite: Department consent.

Provides students with an understanding of how the characteristics and unique objectives of government entities are manifested in the accounting standards, audit risk and disclosure requirements. Topics addressed include the purpose of the various governmental financial statements, basis of accounting, measurement, audit focus, risk, fund types, and financial statement disclosures.

**5563. Enterprise Risk Management: Identify Events as Risks to Manage or Opportunities to Seize**

Three credits. Prerequisite: Department consent.

Provides students with the ability within the COSO framework to identify events that may impact a nonfinancial publicly traded enterprise's ability to realize value for its stakeholders using the concept of the triple bottom line of profit, people, and planet. Events will be evaluated as risks that have negative impacts and opportunities as well as potential positive impacts. ERM techniques applied in the course will include: risk control, business continuity, reputation risk, supply-chain management, compensation system alignment, and strategic decisions.

**5571. Taxation of Business Entities**

Three credits.

Application of basic tax concepts to business entities, with particular emphasis on C corporations and partnerships. At the end of the course, students should be able to identify and address the tax issues faced when forming, operating, and liquidating a business entity.

**5575. Taxes and Business Strategy**

Three credits.

Provides a foundation for understanding how taxes affect economic behavior. Students work through a conceptual framework that describes how tax rules affect business decisions. At the end of this course, students should be able to apply this conceptual framework to a number of settings including compensation, organizational form, investment strategies, and multinational tax issues.

### 5582. Research for Accounting Professionals

Three credits. Prerequisite: Instructor consent.

This course provides students with the information literacy skills required of an accounting professional to identify information needs, specify and implement research strategies, evaluate resources in order to fulfill those needs, and communicate findings.

### 5583. Financial Reporting and Auditing Implications Relating to Income Taxes

Three credits. Prerequisite: Instructor consent.

Focuses on the financial reporting and auditing provisions related to federal, foreign, and state income taxes. Students will learn how to: calculate income tax amounts reported on the income statement, balance sheet, and statement of cash flows; prepare the income tax footnote and related disclosures; identify substantive audit procedures relating to income tax balances and disclosures; and evaluate and recommend internal controls relating to income taxes.

### 5603. Advanced Accounting

Three credits. Prerequisite: ACCT 5622; not open to students who have passed ACCT 4203.

An in-depth study of accounting for business combinations. Coverage also is given to accounting for nonprofit entities and contemporary issues in financial accounting.

### 5894. Special Topics in Accounting

Variable (1-3) credits. Prerequisite: ACCT 5121 or 5182; open only to MBA students. May be repeated for a maximum of nine credits.

Investigation and discussion of special topics in accounting.

### 5895. Independent Study in Accounting

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

Faculty-student interaction on a one-to-one basis involving independent study of specific areas of accounting. Emphasis, selected by the student, may be on theoretical or applied aspects. A written report is required.

### 6200. Investigation of Special Topics

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for up to nine credits.

### 6201. Introduction to Accounting Research

Three credits. Prerequisite: Instructor consent. May be repeated once for credit.

This seminar introduces students to three major elements of accounting research: research validity, with an emphasis on examples in accounting research; paradigms used in accounting research; and basic research design issues and how those issues are illustrated in the accounting literature. Finally, students will be exposed to data sources and analysis with commonly used statistical software.

### 6203. Accounting and Capital Markets

Three credits. Prerequisite: Instructor consent.

Provides a broad survey of capital markets research in accounting and related fields. Students are introduced to major theoretical and methodological issues in this line of research. The seminar focuses on theoretical and intuitive constructs that frame accounting research questions and the methods that are used to address those research questions.

### 6205. Archival Audit Research

Three credits. Prerequisite: Instructor consent.

Provides a broad overview of archival, empirical research in auditing and audit markets. Students are introduced to the major theoretical and methodological issues in this section of research. Topics covered include: audit quality, the supply of/market for auditing, the demand for/value of auditing, internal control, audit committees, audit regulation, and audit opinions.

### 6206. Research in Taxation

Three credits. Prerequisite: Instructor consent.

This seminar provides a broad survey of research in taxation. Students are introduced to the major theoretical and methodological issues in this line of research. The seminar focuses on theoretical and intuitive constructs that frame tax research questions and the methods and data that are used to address those research questions.

### 6211. Seminar in Special Research Topics

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a maximum of eight credits.

Students are exposed to a broad range of accounting research through reading and critiquing research papers presented at the Accounting Department Research Workshop (papers are presented by local scholars as well as scholars from other institutions). The seminar also focuses on how to present effective written and oral criticisms of research papers.

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## Administration (ADMN)

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### 5301. Managing People: Communication Skills in Supervision, Personnel Management and Leadership

Three credits. Prerequisite: BASC 5390 and 5391, and FED 5351 and 5301; open only to M.S.W. students in the Administration concentration. Corequisites: FED 5352 and 5302.

Leadership theory and analysis, supervision, personnel/human resource management, with emphasis on interactional skills. Prepares students to function effectively in supervisory and administrative roles and to use themselves in creative professional ways in exercising leadership in human service settings. Required for students in the Administration concentration.

### 5302. Managing Money: Financial Management Strategies and Fiscal Responsibilities for Social Administrators

Three credits. Prerequisite: ADMN 5301, and FED 5352 and 5302; open only to M.S.W. students in the Administration concentration. Corequisites: ADMN 5353 and FED 5310.

The fundamental principles and processes in financial management processes, budgeting systems, preparation and execution of budgets,

basics of accounting, use of computer spread sheets, managerial accounting, financial statements, cost analysis, inventory and fixed asset accounting, funding sources, financial performance measures, internal control and external audits, fiduciary relationships and responsibilities, liabilities in 501(c)3, ethics in finance, collaborating and leveraging of resources. Required for students in the Administration concentration.

### 5303. Creating and Managing Opportunities in the Organization's Internal and External Environment

Three credits. Prerequisite: Open only to M.S.W. students in the Administration concentration. Corequisite: ADMN 5354 and FED 5311.

Selected internal and external challenges and opportunities for the social work administrator. These include staff relations and organizational climate, the use and organization of the organization's physical environment, the voluntary board, public relations, and strategic alliances. The course gives students opportunities to develop a range of knowledge and skills in work with staff, volunteers, the media, and partners in the community to maximize opportunities to enhance the organization and its services to clients and the community. Required for students in the Administration concentration.

### 5353. Field Education in Administration III

Four credits. Prerequisite: FED 5352 and FED 5302; open only to M.S.W. students in the Administration concentration. Corequisite: ADMN 5302 or POPR 5310 and FED 5310. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required course for students in the Administration concentration.

### 5354. Field Education in Administration IV

Four credits. Prerequisite: Open only to M.S.W. students in the Administration concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required course for students in the Administration concentration.

### 5355. Block Placement in Administration

Eight credits. Prerequisite: FED 5352 and FED 5302; open only to M.S.W. students in the Administration concentration; instructor consent required. Corequisite: POPR 5310 and FED 5350.

Field Education in Administration for well-prepared students who have completed all course requirements except the second year of field education and the appropriate method course. Required course for students in the M.S.W. program completing a Block Field Placement.

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## African Studies (AFRI)

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### 5000. Seminar in African Studies

Three credits.

Interdisciplinary introduction to graduate level study of Africa.

**5105. Special Topics in African Studies**

Variable (1-9) credits. May be repeated for a total of 12 credits.

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**Africana Studies (AFRA)**


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**5100. Impacts of Race on Health Equity and Medical Research and Practice**

Three credits. Prerequisite: Open to Medical and Dental School graduate students with instructor consent.

Impacts of race and racism in medicine, healthcare, and health outcomes in the United States. Sociological, psychological, historical, and medical perspectives on the multiple health risks affecting racialized non-white populations as well as how disparities should be addressed.

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**Agricultural and Resource Economics (ARE)**


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**5150. Microeconomic Foundations for Sustainability**

Three credits.

Theory and tools of microeconomic foundations for sustainable development. Intermediate understanding of applied microeconomics and practicing quantitative techniques for application to economic issues using electronic spread sheets.

**5201. Microeconomics**

Three credits.

Beginning graduate microeconomics covering consumer and producer theory, price determination, economic efficiency, and welfare analysis.

**5211. Quantitative Analysis for Sustainable Development**

Three credits.

Quantitative methods used in the analysis of problems related to sustainable economic development with a focus on agriculture, natural resources, and the environment. Regression analysis, economic impact analysis, feasibility studies, enterprise budgets, and survey methods.

**5215. Sustainable Business Management**

Three credits.

Principles of management strategy with a focus in agribusiness. Marketing, financial and human resource management as well as budgeting techniques and the legal and organizational structure of businesses from the perspective of sustainability.

**5252. Planning for Economic Development**

Three credits. Prerequisite: ARE 5150 and 5211.

Insight into domestic and international economic policy dynamics relevant to economic development as well as application of critical organizational skills to the development of a grant proposal and project development and management. Students are required to use theoretical, methodological and practical applications to sustainable economic development covered in previous courses.

**5305. The Role of Agriculture and Natural Resources in Economic Development**

Three credits. Prerequisite: Instructor consent.

The role of agriculture in the economic development of less developed economies. Microeconomic dimensions of agricultural

development, economics of food consumption and nutrition, agricultural technology and productivity, agricultural supply, land tenure and agrarian reform, foreign assistance, trade agreements, and agricultural price policy.

**5311. Applied Econometrics I**

Three credits. Prerequisite: Instructor consent.

This course deals with the estimation and inference of statistical parameters that describe the data generating process of a society, the process that cannot be reproduced like in a pure science experimentation. In other words, the data are generated from economic systems of equations that are stochastic, dynamic, and simultaneous. An attempt is made to obtain the best, unbiased, and consistent estimates of the statistical parameters that describe the inherent economic phenomena.

**5462. Environmental and Resource Economics**

Three credits.

Natural resource use and environmental quality analysis using economic theory. Reviews of empirical research and relevant policy issues.

**5464. Benefit-Cost Analysis and Resource Management**

Three credits. Prerequisite: Instructor consent.

Theoretical foundations and applications of benefit-cost analysis in project appraisal and in evaluation of public policies regarding resource management and environmental protection.

**5474. Industrial Organization: Empirical Analysis**

Three credits.

Analysis of the structure, conduct, and performance of industries with examples from the food sector and other industries. Explains the development of testable hypotheses from theory, empirical methods, evidence on the level and type of competition, economies of size, product differentiation, entry barriers, and the impact of alternative organizational forms including cooperatives on economic performance.

**5495. Special Topics**

Variable (1-3) credits. May be repeated for a total of 12 credits.

Topics and credits to be published prior to the registration period preceding the semester offerings.

**5499. Independent Study in Agricultural and Resource Economics**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 24 credits.

This course provides the opportunity for graduate students to carry on independent reading or research in the field of the student's needs and interests.

**5991. Professional Internship**

Variable (1-6) credits. Prerequisite: Instructor consent.

Project-based fieldwork with an approved partnering organization related to sustainable economic development, including agribusiness management, marketing and financial analysis, food systems, and economic development.

**5992. Practicum in Economic Development**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Project-based fieldwork with an approved partnering organization related to sustainable economic development, including agribusiness management, marketing and financial analysis, food systems, and economic development.

**6311. Applied Econometrics I**

Three credits. Taught with ARE 5311.

Expose students to techniques in applied economics research. Students will learn models - derivations, assumptions, and issues. The models will be practiced utilizing empirical data and interpreting results in light of economic and econometric theory.

**6313. Applied Econometrics II**

Three credits. Prerequisite: ARE 5311.

An introduction to econometric methods used in contemporary applied economic data analysis. Emphasis on learning how to operationalize different estimation techniques in standard statistical software.

**6464. Experimental Methods for Program Evaluation**

Three credits. Prerequisite: A graduate-level introduction to statistics or econometrics class or equivalent. Recommended preparation: a graduate-level macroeconomic theory course.

Theory and practice of field-based program experiments, often referred to as randomized controlled trials (RCTs). All aspects of experimental program evaluation, including the design of evaluation strategy and working with survey and program staff. Examples from both developing country contexts and Western country program evaluation.

**6466. Environmental Economics**

Three credits. Prerequisite: ARE 5201 or ECON 5201.

Economic analysis of environmental problems and corrective policy instruments. Theory of externalities and public goods, role of uncertainty and imperfect information in policy design, benefit-cost analysis, and non-market valuation. Applications to environmental problems (such as air and water pollution, hazardous waste, and occupational health and safety).

**6468. Economics of Natural Resources**

Three credits.

Economic concepts and issues related to the allocation of stock resources through time, the use and protection of flow resources, and the role of natural resources in economic growth.

**6470. Applied Research in Environmental Economics**

Three credits. Prerequisite: ARE 5201 or ECON 5201, and ARE 5311 or ECON 5312. Recommended preparation: ECON 6466 or ARE 6466 or 6468 or 5462.

Develops a broad perspective on the peer-reviewed literature concerning the frontier areas of contemporary environmental economics, with an emphasis on incentive and market-based approaches to ecosystem services, valuation of environmental quality and assets, interface between experimental and environmental economics, including such topics as land use change, conservation, pollution control, water resource services, forest ecosystem management. Students will develop critical thinking skills

evaluating published studies and identifying gaps in methodology and knowledge for future research.

#### **6472. Microeconomic Applications to Food Markets**

Three credits. Prerequisite: ARE 5201 or ECON 5201 and ARE 5311 or ECON 5311.

Trains students in applied microeconomics, with particular emphasis on food markets and public policy. The course is divided into three broad areas: production economics, economics of consumer behavior, and market analysis. Particular emphasis is placed on quantitative tools using empirical models and welfare economics. Students design and undertake an individualized project in their area of interest.

#### **6474. Empirical Industrial Organization I**

Three credits. Prerequisite: Instructor consent.

Empirical Industrial Organization models that use simultaneous equations, discrete choice, and/or nonlinear econometric methods to analyze conduct and performance of brands and firms in noncompetitive industries. Includes static and dynamic modeling of pricing and advertising in differentiated product oligopolies. Antitrust policy applications in the U.S. and E.U.

#### **6476. Empirical Industrial Organization II**

Three credits.

Builds on Empirical IO I and explores the use of advanced applied methods to gauge consumer demand, firm conduct and relevant policy implications. The empirical methods covered include both structural models, static or dynamic, and reduced forms. To this end, we will discuss papers in class demonstrating these methods. The emphasis will be data, sources of identification, and estimation techniques.

#### **6495. Graduate Research Seminar**

One credit. May be repeated for a total of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Participation in research seminars presented by invited scholars and departmental faculty as well as active presentation of students' own research to colleagues and faculty.

#### **6695. Special Topics**

Variable (1-3) credits. Prerequisite: Department consent. May be repeated for a total of 12 credits.

May be repeated to a maximum of 12 credits with a change of topic. Topics and credits to be published prior to the registration period preceding the semester offerings.

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## **Agriculture and Natural Resources (AGNR)**

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#### **5095. Special Topics**

Variable (1-6) credits. Credits and hours by arrangement. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Topics relating to the College of Agriculture, Health and Natural Resources.

#### **5099. Independent Study in Extension**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

#### **5500. Leadership Development**

Three credits. Prerequisite: Open to students in the College of Agriculture, Health and Natural Resources, others with instructor consent.

Introduction to extension, outreach education and other forms of public engagement (governmental and nongovernmental). For students interested in a career in or knowing about outreach education and public engagement.

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## **Allied Health (AH)**

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#### **5005. Biostatistics for Health Professions**

Three credits.

Basic statistical methods in a broad range of medical or public health problems. Emphasizes the use of these methods and the interpretation of results using biomedical and health sciences applications.

#### **5095. Investigation of Special Topics**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 36 credits.

Advanced topics and investigations in the field of Allied Health Sciences. Topics and credits to be published prior to the registration period preceding the semester offering.

#### **5099. Independent Study for Allied Health**

Variable (1-6) credits. May be repeated for a total of six credits.

Advanced study, project, or research of intensive, independent investigation in allied health consistent with the student's needs, interests and plan of study.

#### **5309. Health and Aging**

Three credits.

Examination of the theoretical and applied issues in optimizing health for older adults. Focus is on the bio-psycho-social aspects of health; application of current research, and leadership skill building for program development.

#### **5314. Professional Development Project**

Three credits. Prerequisite: At least nine credits in Allied Health courses; open only to non-thesis (Plan B) students; instructor consent required. May be repeated for credit.

Examines contemporary issues and problems relevant to allied health practice. Focus is on interdisciplinary exchange of ideas and the development of a project relative to the student's particular program emphasis.

#### **5317. Professional Development Practicum**

Five credits. Prerequisite or corequisite: AH 5314; instructor consent required; open only to non-thesis (Plan B) master's students. May be repeated for a maximum of 24 credits.

The implementation and/or application of theory in AH 5314. A minimum of 300 practicum hours required.

#### **5319. Health Education and Behavioral Interventions for At-Risk Populations**

Three credits.

The study and application of current learning theories, models, and strategies used by experienced health professionals to become effective interventionists within didactic, clinical, and community settings.

#### **5331. Nutrition for Healthy Communities**

Three credits. Prerequisite: Instructor consent.

Development of knowledge and skills in public nutrition including community assessment, development of program policies, and program planning, implementation, and evaluation.

#### **5350. Advanced Medical Nutrition Therapy**

Three credits. Prerequisite: Open only to Dietetics majors, others by consent of the Director of Dietetics; instructor consent required.

Provides student with advanced nutrition therapy information for the effective treatment of complex medical problems. Emphasizes all aspects of the nutrition care process as it relates to medical conditions. The research regarding the physiological, pathological and metabolic basis for nutrient modifications will be emphasized.

#### **5351. Contemporary Nutrition Issues and Research**

Three credits. Prerequisite: Open only to Dietetics majors, others by consent of the Director of Dietetics; instructor consent required.

Critical thinking and application of research to contemporary issues in food and nutrition applied to clinical nutrition and community/public health nutrition. Learning occurs through classroom discussions, self-exploration through reading and applying scientific studies to issues, and participation in a research project.

#### **5366. Environmental Health**

Three credits.

Focuses on the environmental health consequences of exposure to toxic chemicals, food contaminants and radiation. Basic principles of environmental health are discussed, followed by lectures on specific topics such as: cancer and reproductive risks, occupational hazards, radiation, genetic biomonitoring, risk assessment techniques, risk/benefit analysis, social/legal aspects of regulating toxic chemicals, and other related topics.

#### **5370. Applied Advanced Nutrition**

Three credits. Prerequisite: DIET 4727, 4350, 4360 and 4365 or equivalent.

Provides student with advanced nutrition information for the effective management of complex medical and public health problems. Emphasizes the impact of nutrients and food components on human health. The research regarding the physiological, pathological and metabolic basis for nutrients in health and disease will be emphasized.

#### **5501. International Health**

Three credits. Prerequisite: Instructor consent.

Examines international health challenges. Through case studies, other appropriate readings, and individual research students will gain a comprehensive understanding of global health related challenges (medical, economic and cultural), including children's health, women's health, communicable diseases, and non-communicable diseases.

#### **5502. Complex Humanitarian Emergencies Seminar**

Three credits. Prerequisite: Instructor consent.

In-depth examination of both theoretical and applied aspects of complex humanitarian emergencies. It provides students with a comprehensive, multidimensional understanding

of the needs of displaced persons and systems and practices currently in place to meet these needs.

### **5503. Poverty and Public Health**

Three credits.

Social determinants of health and poverty. Health impact assessments. Improving the social determinants of health and poverty, including countries in conflict.

### **5504. Nutrition During Human Emergencies**

Three credits.

Examines the cycle of malnutrition and disease, and major food and nutrition challenges faced by refugee and displaced populations. Covers types of feeding and nutrition supplementation programs in emergencies, and nutritional assessment as a tool to design, target and evaluate feeding and supplementation programs in emergencies. Addresses feeding of special populations such as: infants, pregnant and lactating women, and the elderly during emergencies; international agencies, non-government organizations, and government programs involved with food aid and relief; and food as a human right.

### **5505. Principles of Sustainability**

Three credits.

Provides students with an understanding of the basic principles of environmental, social, and economic sustainability and will assist students to develop the ability to apply these principles to current issues of sustainability.

### **5632. Vaccines: Mechanisms of Immune Protection**

(Also offered as PVS 5632.) Three credits. Prerequisite: Instructor consent.

Focuses on several different approaches to inducing prophylactic immunity in the host. Both traditional and modern molecular approaches to vaccine design will be discussed. In addition, the mechanisms employed by pathogenic microbes to avoid hosts' immune responses will be examined in the context of vaccine design. The students will gain an appreciation for the transition from basic research to practical applications.

### **5700. Ethical Considerations in Genetic Testing and Research**

Three credits. Recommended preparation: a course in human genetics; instructor consent required.

Conceptual and philosophical analysis of ethical issues specific and special to genetic testing and research. Presentations, case studies and readings will provide responsible conduct in research training and allow for analysis of World Wide Web genomics, access to genetic information, privacy and confidentiality, ownership, personal and societal perceptions, reproduction, utility and limitations of genetic data, education of physicians and patients, treatment versus enhancement, regulation and reimbursement, and other time-relevant issues.

### **5710. Genetics and Genomics of Health**

Three credits. Prerequisite: A course in human genetics; instructor consent required.

Interaction of genetic, environmental, and behavioral factors in the predisposition to disease, onset of disease, response to treatment and maintenance of health. Genetics and genomics in health promotion and disease prevention will be examined through seminars and literature review.

### **5715. Current Topics in Clinical Genetics**

One credit. Prerequisite: Instructor consent. May be repeated for a total of two credits. Recommended preparation: a course in human genetics. Open by instructor consent.

Exploration of current research and advances in clinical genetic diagnosis and testing through primary literature review.

### **5720. Theory and Practice of Clinical Genomics**

Variable (1-3) credits. Recommended preparation: a course in human genetics; instructor consent required. May be repeated for credit with a change of content.

Theory and practice of diagnostic laboratory methodologies and genomic data analyses for the clinical scientist. Sections are taught in a series of modules and include clinical case scenarios and analyses. With a change of content, this course may be repeated for credit.

### **6005. Multilevel Mediation-Moderation Modeling for Health Sciences**

Three credits. Prerequisite: A course in precalculus or higher; AH 5005 or other advanced/graduate course in statistics.

Presents advanced multivariate statistical methods focusing on statistical techniques commonly used in empirical research under a latent-variable approach. Teaches students multilevel mediation-moderation techniques in order to analyze complex or multilevel databases. At the end of the course, students will understand how to analyze multivariate data using multilevel mediation-moderation concepts to test a variety of health-related research hypotheses. Knowledge of linear models is needed for participants enrolling in this course.

### **6094. Health Promotion, Disease and Disability Prevention Research Seminar**

Three credits.

Inquiry into the theory and nature of research in health promotion, disease and disability prevention. Students are encouraged to meet regularly with their major advisors.

### **6181. Experiential Learning in Health Promotion Research**

Variable (1-6) credits. Prerequisite: AH 6324, and a graduate statistics course; open only to doctoral students after their first semester of doctoral work; instructor consent required. May be repeated for a maximum of six credits.

Mentored research experiences on and/or off-campus to increase doctoral student's breadth and depth of knowledge, skills and competence in health promotion science.

### **6184. Graduate Seminar in Health Promotion Research**

One credit. Prerequisite: Instructor consent. May be repeated for a total of five credits.

In a small learning environment under the direction of one or more faculty, students develop their research and academic abilities in health promotion sciences. Activities include: individual goal setting and implementing learning plans; attending scientific seminars; preparing and delivering research presentations; research writing; college-level teaching; grant and compliance administration; and applying for post-graduate employment.

### **6305. Program Planning and Evaluation for Health Professionals**

Three credits. Prerequisite: Instructor consent.

A theoretical and practical introduction to program evaluation for health professionals who deliver health care services, manage departments and personnel, or provide training and continuing educational opportunities. Students apply the practical program evaluation framework for health-related intervention programs and document the impact of interventions within health promotion and disease and disability prevention programs. Skill development is facilitated.

### **6306. Research Methods in Allied Health**

Three credits. Prerequisite: EPSY 5605 or a course in basic statistics.

An inquiry into the nature of research with emphasis on the spirit, logic, and components of the scientific method. Health related research literature is used to aid the student in learning to read, understand, and critically analyze published materials. The preparation of research proposals and reports is emphasized.

### **6324. Critical Issues in Health Promotion, Disease and Disability Prevention**

Three credits. Prerequisite: Instructor consent.

An in-depth study of health promotion, disease and disability prevention policies, programs and strategies.

### **6405. Exercise Intervention for Health Promotion in Persons with Chronic Disease and Disability**

Three credits. Prerequisite: Instructor consent.

In-depth information for determining functional capacity and developing appropriate exercise programming for optimizing functional capacity of persons with chronic disease and/or disabilities. Understanding the effects of exercise on the disease process as well as the effects of disease on the exercise responses in chronic disease and disability are explored.

### **6409. Geriatric Nutrition**

Three credits. Prerequisite: Instructor consent.

In-depth information on nutritional problems and requirements for the healthy and ill older adult. The focus is on design and critique of research methodology in the nutrition literature. Development and presentation of a major nutrition-related research proposal is required of all students.

### **6420. Clinical Management Models for Health Promotion**

Three credits. Prerequisite: Instructor consent.

Systematic design and analysis of the roles of health service managers and clinicians in the delivery of services for managed care are addressed. The course will analyze health care delivery from an integrated management-clinician perspective. Attention will focus on patient care and the use of clinical algorithms and critical pathways in health-care delivery.

### **6421. Design and Implementing Health Promotion Programs**

Three credits. Prerequisite: Instructor consent.

Designed to assist students with the skill development necessary to design and implement health promotion programs via a settings approach. Various program development models will be

presented. Experts from the field will be integrated into the course from various programmatic settings.

#### **6422. Writing Successful Grant Proposal**

Zero credits. Prerequisite: Instructor consent.

Designed for advanced graduate student in a health field to obtain experience writing a scientific research proposal. Students will be expected to enter the course with both a fairly well developed research topic and an actual Request for Proposal in hand. The final outcome from this class will be a grant proposal that is suitable for submission to a funding agency.

#### **6423. Advanced Topics in Stress and Health Promotion**

Three credits.

Selected topics in assessing and treating stress related disorders in health care delivery are examined. Emphasis on diagnosis, treatment, and prevention interventions are examined. Current measures used in assessment along with self-management skills for patients are the focus of this course.

#### **6424. Principles and Practices of Alternative/ Complementary Medicine**

Three credits.

Critically reviews the evolving modalities of alternative therapies and mind-body interventions. The major components of alternative medicine, providing a review of the scientific basis, physiology and psychoneuroimmunology of the disciplines of holistic mind-body therapies will be presented. The role of energetics and spirituality in human health promotion and disease prevention will be discussed.

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### **American Studies (AMST)**

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#### **6000. American Studies: Methods and Major Texts**

(Also offered as ENGL 6800 and HIST 6000.) Three credits. Prerequisite: Open only to graduate students in English, History, and Political Science, others with instructor consent.

Introduction to the methodologies and topics of American Studies through a survey of major texts in the field, past and present. Also provides a history of the field.

#### **6500. American Studies: Special Topics**

(Also offered as ENGL 6850 and HIST 6500.) Three credits. Prerequisite: Open only to graduate students in English, History, and Political Science, others with instructor consent.

Detailed study of a specific topic in American cultural studies with an emphasis on developing skills in interdisciplinary research. Topics vary from semester to semester. May be repeated once for credit with a change in topic.

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### **Animal Science (ANSC)**

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#### **5601. Experimental Design in Animal Science**

Three credits. Prerequisite: Instructor consent.

Discussion of the basic principles of design and analysis for experiments in animal and food science. Both theory and practical application of designing experiments will be included. Emphasis is placed on data analysis using SAS, highlighting

determination of the most appropriate analysis for an experiment and interpretation of output.

#### **5612. Advanced Nutrition**

Two credits. Prerequisite: Instructor consent.

Critical review of current literature on digestive physiology, metabolism, feed processing and management related to ruminant animals.

#### **5613. Growth and Metabolism of Domestic Animals**

Three credits.

An assessment of animal growth and metabolism interrelated to nutrition, selection, environment, production and idiosyncrasies among species.

#### **5614. Advanced Animal Nutrition**

Three credits. Prerequisite: Instructor consent.

A comparative study of nutritional, physiological, microbiological, immunological and biochemical aspects of digestion and metabolism in the non-ruminant and ruminant animal. Topics include digestive system structures, utilization of nutrients, energy metabolism, control of nutrient metabolism, and experimental techniques used in the study of animal nutrition. Feedstuffs appropriate to meet nutrient requirements and ration formulation across various physiological stages, growth, gestation, and lactation will be covered in this course. There will be a focus on developing critical thinking skills, reading current literature, and assimilating scientific concepts in written and oral forms.

#### **5615. Comparative Exercise Physiology**

Three credits.

In depth discussion of the effects of exercise on the body with emphasis placed on the physiological mechanisms which allow for adaptation to periods of exercise and inactivity. Idiosyncrasies among the athletic species will be highlighted.

#### **5616. Endocrinology of Farm Animals**

Three credits.

In depth discussion on endocrine systems and endocrine function in farm animals with emphasis on hormones involved in metabolism, growth, lactation, feed intake and digestion in cattle, pigs, horses and poultry.

#### **5618. Probiotics and Prebiotics**

Three credits.

Biology, uses, effectiveness and safety of probiotics and prebiotics. Molecular mechanisms underlying the health benefits attributed to the consumption of pre and probiotics. Application of pre and probiotics to promote human and animal health, including safety and regulation. A background in general microbiology or concurrent registration in a microbiology course is recommended.

#### **5619. Signaling Pathways**

Three credits. Recommended preparation: previous three credit course in cell biology, molecular biology, or biochemistry.

Principles of cell signaling transduction. Major cellular regulatory pathways and interactions between pathway components. Regulatory mechanism of various cellular processes via specific signaling network, and methods used for studying cell-signaling pathways.

#### **5621. Frontiers in Animal Embryo Biotechnology**

Three credits.

Focuses on the epigenetics and molecular aspects of embryology such as genomic imprinting and X inactivation. Introduces the state of numerous established and emerging embryo biotechnologies such as assisted reproductive technologies; gamete cryopreservation; transgenesis; nuclear transfer (cloning); gene targeting/genome editing; xenotransplantation; embryonic and tissue stem cells, induced pluripotent stem cells and their applications.

#### **5623. Current Advances in Epigenetics**

(Also offered as MCB 5470.) One credit. Prerequisite: Instructor consent. May be repeated for a total of three credits.

A field of modern biological research that is concerned with influences on gene expression, developmental biology, and disease that are mediated by mechanisms independent of DNA sequence. Literature review in which each student will present and critically analyze primary literature in epigenetics. All students will present and participate in detailed technical evaluations of selected papers, and develop a written proposal for future research based on the paper(s) that they present individually. Topics include imprinting, X chromosome inactivation, chromatin dynamics, and cloning (nuclear transfer).

#### **5640. Animal Food Products: Dairy Technology**

Three credits. Two class periods and one 2-hour laboratory or discussion period. Prerequisite: Instructor consent.

Production and processing of milk and milk products from a food science perspective, including chemical, physical, and microbiological components. Technological aspects of the transformation of milk into various food products. Public health regulations, good manufacturing practices, cleaning and sanitizing procedures. Unit operations in dairy food manufacturing, packaging, labeling, and quality control procedures.

#### **5641. Food Chemistry**

Three credits. Prerequisite: Instructor consent.

Chemical, physical and biological changes in foods and food macromolecules that occur during processing and storage that affect texture, color, flavor, stability and nutritive qualities. Field trips may be required.

#### **5683. Graduate Teaching Experience**

One credit. Prerequisite: Instructor consent. May be repeated for a total of three credits.

Mentored experience in developing and presenting lectures and/or laboratory activities for existing ANSC undergraduate courses.

#### **5692. Research**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 24 credits.

Independent research in animal science, livestock production, meats, dairy production, animal nutrition, growth, reproductive physiology, animal breeding, or environmental health.

#### **5693. Graduate Presentation Skills**

One credit. Prerequisite: Instructor consent.

Discussion-based class that prepares students to make oral presentations.

#### **5694. Animal Science Seminar**

One credit. Prerequisite: Instructor consent. May be repeated for a total of two credits.

Students present a seminar on the topic of their thesis research.

### **5695. Special Topics in Animal Science**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits. May be repeated for credit with a change of topic.

### **5699. Independent Study**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

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## **Anthropology (ANTH)**

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### **5305. Investigation of Special Topics**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Special topic readings or investigations according to the needs of each student.

### **5306. Human Behavioral Ecology**

Three credits.

Applies the theory of natural selection to the study of human behavior in an ecological setting, with particular focus on the adaptive features and biological design of human behavior.

### **5308. Human Evolutionary Theory**

Three credits.

Evolutionary concepts applied to human body size and shape, diet, disease, group composition, and reproductive behavior.

### **5311. History of Anthropological Theory**

Three credits. Prerequisite: Instructor consent.

Development of theory from the nineteenth century through the 1970s. Required for graduate students in Cultural and Historical Anthropology.

### **5312. Seminar: Contemporary Theory in Social and Cultural Anthropology**

Three credits. Prerequisite: Instructor consent.

Selected current issues and debates in the discipline.

### **5315. Gender and Culture**

(Also offered as WGSS 5315.) Three credits.

Anthropological perspectives on the analysis of gender with special focus on dynamics of gender, culture, and power.

### **5316. Globalization and Transnational Anthropology**

Three credits.

Methods and theories in the study of cultural, social, political and economic phenomena spanning international frontiers; historical origins of transnational anthropology, theories of globalization, ethnographic case studies.

### **5321. Ethnographic Methods I**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Theoretical foundations and basic tools used to conduct professional field studies in anthropology. Research design; moral and ethical dimensions of field work; designing and conducting informal, semi-structured and structured interviews (one-on-one and in groups); managing field notes, questionnaires, and data; computer data management; summary statistics and graphics; identifying and interpreting random variation; modeling and testing explanations.

### **5322. Research Methods and Design**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Selected topics in ethnographic methods and research design.

### **5333. Evolution and Cognition**

Three credits.

Introduction to recent work in evolutionary psychology, exploring the variety of ways in which we can understand human cognition as a product of evolution.

### **5334. Culture and Religion**

Three credits. Prerequisite: Instructor consent.

Theories and problems in the analysis of non-western religious systems.

### **5341. Analysis of Rituals**

Three credits. Prerequisite: ANTH 5311.

Examines various theoretical contributions to the anthropological study of ritual. Controversies and ambiguities surrounding the social and symbolic significance of the ritual act for both men's and women's experiences and participation are addressed.

### **5345. The Neanderthals**

Three credits. Prerequisite: Instructor consent.

Biological, cultural, technological, and behavioral evolution of Neanderthals as understood through the fields of genetics, physical anthropology, palaeolithic archaeology, human behavioral ecology, hunter-gatherer ethnography, palaeoclimatology, chronometric dating, and geology. Neanderthal-Modern Human interactions and the Middle-Upper Palaeolithic transition are also considered.

### **5352. Medical Anthropology**

Three credits. Prerequisite: Instructor consent.

Overview of current theory and practice in medical anthropology.

### **5353. Applied Anthropology**

Three credits.

Overview of various applications of anthropology to solve human problems both internationally and within the United States. Emphasis upon history of applied anthropology, ethical considerations, and specific roles of anthropologists in development.

### **5356. History of Archaeological Theory**

Three credits. Prerequisite: Instructor consent.

A critical review of the development of archaeology, with particular emphasis on the theoretical innovations of the 1960s and 1970s.

### **5363. Archaeological Site Formation Processes**

Three credits.

Creation of archaeological sites by human behavior and geological forces. The characteristics of various formation processes and identification of them in the archaeological record.

### **5376. Ethnomedicine**

Three credits.

Medical systems in cultural context. Traditional healers, herbal medicine, culture bound systems, the meaning of illness, curing and disease. Impact of biomedicine on traditional and alternative medical systems.

### **5377. Global Health and Anthropology**

Three credits. Prerequisite: Instructor consent.

Assessing global morbidity and mortality; global health governance; political economy of global health; health inequities; social determinants of health; syndemics; climate change and health; maternal and child health; nutrition; infectious diseases; and war, trauma, and complex emergencies.

### **5378. Anthropology of Infectious Diseases**

Three credits. Prerequisite: Instructor consent.

Examination of medical anthropological research and insights on biosocial/biocultural factors in the spread of infectious diseases, including human understanding and responses across cultural groups and through time, anthropogenic factors in contagion, and the nature and pathways of adverse infectious disease interactions.

### **5390. Cultural Rights**

Three credits. Prerequisite: Instructor consent.

Politics of culture and cultural rights, minority rights, indigenous rights, multicultural policies, race, difference and law, cosmopolitanism, globalization and human rights.

### **5391. Human Rights in a Diverse World**

Three credits.

Basic issues, methods and theories in the anthropological study of human rights; cultural relativism, the international human rights system, social movements, transnational activist networks, media and representation are studied in their relationship to rights claims, adjudication, and outcomes.

### **5400. Introduction to Stable Isotopes**

Three credits. Prerequisite: Open only to graduate students; others with instructor consent.

Introduction to stable isotope theory, methodology, and applications.

### **5450. Paleoclimate Reconstruction**

Three credits. Prerequisite: Open only to graduate students; others with instructor consent.

The impact of past climate on human societies, from Mid-Pleistocene to late Holocene, discussed in light of modern climatology and paleoclimate reconstruction methods.

### **5500. Professional Development in Anthropology**

Three credits. Prerequisite: Open only to Anthropology graduate students; others with instructor consent.

Hands-on survey of practical skills required for professional anthropology, including writing research plans, grant applications, manuscript preparation, teaching philosophies, professional behavior and ethics.

### **5510. The Neanderthals**

Three credits. Prerequisite: Instructor consent.

Interdisciplinary understanding of the biological, cultural, technological and behavioral evolution of Neanderthals and their societies.

### **5512. Modern Human Origins**

Three credits. Prerequisite: Instructor consent.

Earliest modern people in Africa: their way of life seen from the archaeological, fossil, and genetic evidence.

**5513. Modern Human Dispersals**

Three credits. Prerequisite: Instructor consent.

Interdisciplinary understanding of the tempo and mode of modern human dispersals across Europe, Asia, Australia, and the Americas.

**5515. Ancient Civilizations of the Old World**

Three credits. Prerequisite: Instructor consent.

Examination of early civilizations in Mesopotamia, Egypt, the Indus Valley, and sub-Saharan Africa. Theories explaining the development and collapse of early state-level societies are critically considered.

**5517. Hunter-Gatherers Past and Present**

Three credits. Prerequisite: Instructor consent.

Investigation of recent and prehistoric hunter-gatherer societies informed by human behavioral ecology, archaeology, and ethnoarchaeology.

**5522. Ecological Anthropology**

Three credits. Prerequisite: Instructor consent.

Interdisciplinary study of human ecology integrating ecological and anthropological theory with archaeological, historical, and contemporary case studies.

**5609. Quantitative Zooarchaeology**

Three credits. Prerequisite: Instructor consent.

Archaeological problem solving using zooarchaeological and taphonomic data; the evolutionary ecology of human economies; evaluation and quantification of zooarchaeological data; formation of faunal assemblages

**5706. Archaeobotany**

Three credits. Prerequisite: Instructor consent.

Method and theory of studying archaeological plant remains in the laboratory, including sampling, identification, and interpretation of data.

**5707. Quantitative Archaeobotany**

Three credits. Prerequisite: Instructor consent. Recommended preparation: ANTH 5706.

Archaeological problem-solving using archaeological data; formation of assemblages; generation, analysis, interpretation, and evaluation of data; subsistence economies and plant domestication.

**5708. Plants and People Through the Ages**

Three credits.

Survey of the dynamic relationship between plants and people using an inter-disciplinary approach. Readings draw from anthropology, archaeology, botany, ecology, history, and agricultural and environmental sciences.

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## Applied Linguistics and Discourse Studies (ALDS)

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**5000. Foundations of Applied Linguistics and Discourse Studies**

Three credits.

Issues in applied linguistics such as second language learning and teaching, curriculum development, language assessment and program evaluation, sociolinguistics, technological application in language learning and teaching, discourse analysis, and cognitive approaches to applied linguistics.

**5020. Second Language Speech Learning**

Three credits. Prerequisite: Open to graduate students in Literatures, Cultures, and Languages; others with instructor consent. Recommended preparation: LING 2010 or equivalent.

Examines factors affecting second language (L2) speech learning such as L1 transfer, motivation, anxiety; sociolinguistic aspects of L2 speech and L2 pronunciation teaching and learning.

**5040. Developing Pragmatic Competence in Another Language: Research and Practice**

Three credits. Prerequisite: Open to graduate students in Literatures, Cultures, and Languages; others with instructor consent.

An introduction to pragmatics in second language acquisition with emphasis on research and practice in the teaching and learning of a second language.

**5060. Language Socialization**

Three credits. Prerequisite: Open to graduate students in Literatures, Cultures, and Languages; others with instructor consent.

An introduction to concepts, methods, and practices of research in language socialization as well as analysis of research from a wide variety of languages and cultures.

**5070. Applied Cognitive Linguistics**

Three credits. Prerequisite: Open to graduate students in Literatures, Cultures, and Languages; others with instructor consent.

Introduction to cognitive linguistics with emphasis on its application to the creation of multimodal texts and the teaching and learning of a second language.

**5385. Special Topics**

Three credits. Prerequisite: Instructor consent. May be repeated for up to six credits with change in content.

**5388. Variable Topics**

Three credits. Prerequisites and recommended preparation vary. May be repeated for up to six credits with change in content.

**5399. Independent Study**

Credits and hours by arrangement. Prerequisite: Instructor consent. May be repeated for up to 12 credits with change in content.

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## Art (ART)

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**5301. Graduate Studio Art (Ceramics)**

Variable (3-6) credits. Prerequisite: Open only to Studio Art MFA students, others with consent. May be repeated for credit.

**5303. Graduate Studio Art (Painting)**

Variable (3-6) credits. Prerequisite: Open only to Studio Art MFA students, others with consent. May be repeated for credit.

**5304. Graduate Studio Art (Photography)**

Variable (3-6) credits. Prerequisite: Open only to Studio Art MFA students, others with consent. May be repeated for credit.

**5305. Graduate Studio Art (Printmaking)**

Variable (3-6) credits. Prerequisite: open only to Studio Art MFA students, others with consent. May be repeated for credit.

**5306. Graduate Studio Art (Sculpture)**

Variable (3-6) credits. Prerequisite: Open only to Studio Art MFA students, others with consent. May be repeated for credit.

**5307. Graduate Studio Art (Drawing)**

Variable (3-6) credits. Prerequisite: Open only to Studio Art MFA students, others with consent. May be repeated for credit.

**5308. Graduate Studio Art (Video)**

Variable (3-6) credits. Prerequisite: Open only to Studio Art MFA students; instructor consent. May be repeated for credit.

**5309. Graduate Studio Art (Performance)**

Variable (3-6) credits. Prerequisite: Open only to Studio Art MFA students; instructor consent. May be repeated for credit.

**5310. Graduate Art Seminar**

Three credits. Prerequisite: Open only to Studio Art MFA students, others with consent. May be repeated for credit.

Discussions, readings, and analyses relating current studio work to contemporary trends in art.

**5320. Issues in Art Criticism**

Three credits. Prerequisite: Open only to Art MFA students; Instructor consent required.

Seminar investigating selected critical and theoretical issues of significance to the visual arts, involving a core of general reading and discussion on historical and contemporary topics in art from the 20th century to the present day. An individual research project culminating in an oral presentation and a final paper on the research are required.

**5330. Interdisciplinary Study**

Variable (3-6) credits. Prerequisite: Open only to Studio Art MFA students, others with consent. May be repeated for credit.

Special course work that combines resources in art and/or areas outside of art.

**5340. Studio Art Instruction and Curriculum Planning**

Three credits. Prerequisite: Open only to Studio Art MFA students. Must be taken in the second semester in the initial program year by all graduate students with teaching appointment.

Teaching methods, strategies, and curriculum planning in studio art instruction.

**5383. Special Topics in Studio Art**

Three credits. Prerequisite: Instructor consent. With change of content, may be repeated for a total of 12 credits.

Seminar focused on special, limited topic relating to practices in studio art. The content will vary from semester to semester.

**5392. Independent Study**

Variable (3-6) credits. Prerequisite: Open only to Studio Art MFA students, others with consent. May be repeated for credit.

**5397. M.F.A. Project**

Six credits. Prerequisite: Open only to Studio Art MFA students, others with consent.

Seminar and studio work culminating in required exhibition, supported by a written statement, public presentation and photographic color-transparency portfolio.

## Art History (ARTH)

### 5319. Introduction to Art History Methods and Theories

Three credits. Prerequisite: Open only to graduate students.

This seminar focuses on developing visual analysis, critical reading, and writing skills by exploring the historiography and most theoretically relevant methods of Art History and Visual Culture. Taught by the full complement of art history faculty and museum and gallery professionals, focus varies with instructor. Possible topics include: social history, gender, sexuality, psychoanalysis, formalism, aesthetics, post-structuralism, post-colonialism, critical race studies, media, and technologies.

### 5320. Issues in Art Criticism

Three credits. Prerequisite: Open only to graduate students. May be repeated to a maximum of six credits with a change in course content.

Topics in visual arts criticism, including art criticism debates, practices, writing art criticism, and the impact and use of social networking media. Components vary. May be offered online or as seminar.

### 5321. Historiography of Art History

Three credits.

Philosophical, theoretical, cultural and historical issues that underwrite art historical methods.

### 5330. Curatorial Practices

Three credits. Prerequisite: Open only to graduate students.

Issues facing curators working in the arena of contemporary art today in a globalized art world.

### 5370. Issues in Contemporary Art

Three credits. Prerequisite: Open to graduate students in Studio Art or Art History; instructor consent required.

Critical and theoretical issues in twentieth and twenty-first century art production and reception including modernism, postmodernism, feminism, technology, and globalization.

### 5383. Special Topics in Art History

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Seminar focusing upon a special, limited topic in the history of art. The content will vary from semester to semester.

### 5392. Independent Study

Three credits. Prerequisite: Instructor consent. With a change of content, may be repeated for a total of six credits.

Independent study in Art History.

### 5397. Museum Studies Internship

Three credits. Prerequisite: Instructor consent. With a change of content, may be repeated for a total of six credits.

Internship practicum in museum, gallery, or other curatorial context.

## Basics (BASC)

### 5300. Human Oppression: The African-American and Puerto Rican Perspective

Three credits. Prerequisite: Open only to Social Work students in the M.S.W. program and non-degree students. Must be taken prior to or concurrent with first year of field education.

Examines economic, political, social and cultural forces operating at global, national and local levels, which generate and maintain oppression based on race and ethnicity in the United States. Focuses on the oppression of the Black and Latino populations in the United States, highlighting the African-American and Puerto Rican experiences and perspectives. It will provide a framework for analyzing and understanding oppression. A historical perspective will be utilized to explore past and current oppression related to race and color, culture and ethnicity, social class, gender, sexual/emotional orientation and religion. Intercultural, intracultural, psychosocial, social and political responses to oppression will be addressed throughout the course. Required course for students in the M.S.W. program.

### 5301. Special Populations

One credit.

The goal of the course is to provide an opportunity for students to understand and to critically analyze human oppression and issues that are relevant to social work practice methods. The course will examine demographic, economic, political, social and cultural forces operating at national and local levels highlighting the African-American and Puerto Rican experiences and perspectives. The focus of the class is the application of the knowledge of special populations to the social work practice methods. The course will combine lectures by the instructor and invited speakers, and class discussions. At times, small groups will be used to encourage students to examine their personal and professional interactions with oppression, and to discuss their implications for social work practice. Required course for students in the Advanced Standing Option and must be taken in the summer prior to the beginning of full time study for the M.S.W. degree.

### 5333. Research Methods for Social Work Practice

Three credits. Prerequisite: Open only to Social Work M.S.W. students.

Provides an understanding of the basic foundation of social work research. Students will learn to: 1) develop critical thinking and knowledge of the principles and methods of research as tools for evaluating their practice; 2) become acquainted with the process and function of research in the advancement of social work theory, knowledge, and practice; 3) value ethical practices in conducting research with diverse individuals and vulnerable populations; 4) judge the adequacy and value of research findings in social work by the use of generally accepted criteria; 5) incorporate computer-based technology in accessing information; and 6) understand the researcher/evaluator role in social work practice.

### 5350. Analysis of Social Welfare Policy and Social Service Delivery Systems

Three credits. Prerequisite: Open only to Social Work students in the M.S.W. program and non-degree students. Must be taken prior to or concurrent with first year of field education. Policy Practice students must take this course prior to or concurrent with POPR 5301.

Provides a critical analysis of the historical roots of American social welfare policy, the formulation of policy, and the economic and political determinants of contemporary policy development. Examination and analysis of the inter-relationship between social welfare policy, the service delivery systems, and practice implications for private and public agencies and programs. Also includes the examination of international issues in social welfare policy and social service delivery. Students will analyze and apply the results of policy research relevant to social service delivery; understand and demonstrate policy practice skills in regard to economic, political and organizational systems; use them to influence, formulate, and advocate for policy consistent with social work values, and identify financial, organizational, administrative, and planning processes required to deliver social services. Required course for students in the M.S.W. program.

### 5362. Human Behavior in the Social Environment: Macro and Micro Theories

Three credits. Prerequisite: Open only to Social Work students in the M.S.W. program and non-degree students.

Emphasizes social work's "person in environment" frame of reference from both micro and macro perspectives. Content areas stressed throughout the course include theories and research about the interdependence and impact of social, political, economic, and cultural contexts on societal and individual well-being. Micro content areas include theories related to the biopsychosocial functioning of individuals, small groups and families in transaction with social, economic, political, and cultural contexts and forces. Cultural and ethnic diversity, institutional prejudice, especially racism and sexism, issues of social, economic and political justice and the process of social change as they impact micro and macro systems will be stressed. Values and ethical issues relevant to macro and micro social work will also be considered.

### 5390. Macro Foundation Practice

Three credits. Prerequisite or corequisite: BASC 5362. Corequisite: BASC 5391 and FED 5301 and 5351.

Focus on macro practice foundation knowledge and skills associated with generalist practice in administration, community organizing and policy practice. Explores the history and place of macro methods in the evolution of the social work profession. Students are introduced to the unique language and perspective of macro practice as a capacity building and strength based intervention. Definitions of and ways to analyze communities, organizations and policies. Emphasis is given to strategies and tactics for achieving change in communities, organizations and policies, to improving services for populations at risk, and promoting diversity and distributive justice, including an international context. Particular ethical and value mandates and dilemmas associated with

macro practice are identified throughout. Required course for students in the M.S.W. program. One of the two foundation practice courses taken the first semester of the first year of field placement.

#### **5391. Micro Foundation Practice**

Three credits. Prerequisite: BASC5362. Corequisite: BASC 5390 and FED 5301 and 5351.

Provides a history of and a foundation for micro social work theory and practice emphasizing ecological, strengths and capacity building perspectives. Knowledge, values and skills associated with generalist practice with individuals, families and groups within the context of organizations and communities. Examines the mission of the social work profession and its value and ethical base, including its commitment to diversity, populations-at-risk and social and economic justice. Strategies for helping client-systems will include preparing for practice; developing mutual working agreements; engaging, assessing and formulating goals; implementing interventions; monitoring and evaluating progress; and terminating services. Emphasizes integration of course content with field experience. One of the two foundation practice courses taken the first semester of the first year of field placement. Required course for students in the M.S.W. program.

## **Biomedical Engineering (BME)**

#### **5000. Physiological Systems I**

Three credits. Prerequisite: Instructor consent. Recommended preparation: BME 3100.

Eleven major human organ systems are covered in this course, including: integumentary, endocrine, lymphatic, digestive, urinary, reproductive, circulatory, respiratory, nervous, skeletal, and muscular.

#### **5010. Research Methods in Biomedical Engineering**

(Also offered as GPAH 6306.) Three credits.

Inquiry into the nature of research with emphasis on the spirit, logic, and components of the scientific methods. Health related research literature is used to aid the student in learning to read, understand, and critically analyze published materials. The preparation of research proposals and reports is emphasized.

#### **5020. Clinical Engineering Fundamentals**

Three credits. Prerequisite: Instructor consent.

Provides the fundamental concepts involved in managing medical technology, establishing and operating a clinical engineering department, and the role of the clinical engineering designing facilities used in patient care. Topics covered include managing safety programs, technology assessment, technology acquisition, the design of clinical facilities, personnel management, budgeting and ethical issues of concern to the clinical engineer.

#### **5030. Human Error and Medical Device Accidents**

Three credits.

Basic principles needed to analyze medical devices, medical device users, medical device environments and medical device accidents. It particularly focuses on human factors engineering as an important step to minimizing human error.

The role of medical device manufacturers, medical device regulators and medical device owners are examined to identify their role in reducing medical device use errors and medical device accidents. The nature and types of human error as well as a taxonomy of medical device accidents are presented. Investigative techniques involving root cause analysis and failure modes and effects analysis are taught and applied to industrial and medical device accidents. Operating room fires, electrosurgical and laser burns, anesthesia injuries, infusion device accidents, catheters and electrode failures and tissue injury in the medical environment are in detail. A semester project will require the student to employ these tools and techniques to analyze a medical device accident.

#### **5040. Medical Instrumentation in the Hospital**

Three credits.

This course will examine current major technologies in use by healthcare practitioners. It will review the physiological principles behind each technology, the principles of operation, major features, methods for testing and evaluating each technology and will highlight available versions of the devices on the market today. Technologies to be covered will be selected from anesthesia equipment, surgical and ophthalmic lasers, cardiac assist devices, surgical & endoscopic video systems, radiographic and fluoroscopic devices, CT, MRI, ultrasound imaging equipment, radiation therapy, nuclear medicine, clinical chemistry analyzers, spectrophotometers and hematology analyzers. Course is based on one text, selected manufacturers training documents as well as journal articles from current medical publications. Grading will be based on exams, quizzes, a semester project and class participation. Several classes will take place on site in Hartford area hospitals in order to observe and examine the equipment being discussed.

#### **5050. Engineering Problems in the Hospital**

Three credits. Prerequisite: Instructor consent.

Covers engineering solutions to problems that are found in the healthcare environment. Includes wide variety of topics such as electrical power quality of and the reliable operation of high tech medical equipment; electrical safety in the patient care environment; electromagnetic compatibility of various medical devices and electromagnetic interference; radiation shielding and radiation protection; medical gas systems, medical ventilation systems and indoor air quality; fire protection systems required in the hospital; networking medical devices, patient information systems, digital imaging and image storage systems; telemedicine and medical image transmission; and finally, hospital architecture and the design of patient care facilities.

#### **5060. Clinical Engineering Rotations I**

Three credits.

Associated with the clinical engineering rotations that interns experience in hospitals, such as surgeries, CT, MRI, ICU, clinical laboratory and physical therapy.

#### **5061. Clinical Engineering Rotations II**

Three credits.

Associated with the clinical engineering rotations that interns experience in hospitals, such

as surgeries, CT, MRI, ICU, clinical laboratory and physical therapy.

#### **5070. Clinical Systems Engineering**

Three credits. Prerequisite: Instructor consent.

Primarily covers medical device connectivity and interoperability. This includes connecting medical devices to the hospital computer network to pass data to the patient medical record or to other medical devices for the purpose of feedback and control. The course will cover basic networking concepts, hospital network architecture, medical systems security and risk management, the role of interconnecting middleware, HL7 and DICOM data standards, moving data on the network, clinical information systems, digital imaging and image storage systems, medical device plug-and-play concepts, and a medical device integration project walk-thru.

#### **5099. Independent Study**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

Individual exploration of special topics as arranged by the student with an instructor of his or her choice.

#### **5100. Physiological Modeling**

Three credits. Prerequisite: instructor consent required. Recommended preparation: BME 3100 and 3400.

Unified study of engineering techniques and basic principles in modeling physiological systems. Focuses on membrane biophysics, biological modeling, and systems control theory. Significant engineering and software design is incorporated in homework assignments using MATLAB and SIMULINK.

#### **5150. Dynamical Modeling of Biochemical Networks**

Three credits.

Recent advances in biological measurement technology have opened up a new era in quantitative biology. Part of this revolution is the new field of systems biology, which consists of viewing processes in biological cells as a whole, rather than considering one gene or protein at a time. Systems biology relies heavily on mathematical models of cellular processes, often derived from the microscopic laws of chemical and enzyme kinetics. Focus primarily on continuum (differential equation) models of cellular processes arising from these microscopic laws. Because most of these models wind up being nonlinear, time is devoted to learning techniques to analyze systems of nonlinear ordinary differential equations, and we will explore the fundamental differences between linear and nonlinear systems. Biological applications will include modeling observed error rates in protein translation, using system nonlinearities to design biological toggle switches, and exploring biological motifs that lead to oscillations, switches, and other behaviors.

#### **5210. Biomedical Optics: Tissue Optics, Instruments and Imaging**

Three credits. Prerequisite: PHYS 1502Q and ENGR 3101.

Principles and imaging of biomedical optics. Optical absorption, scattering and their biological origins, radiative transfer equation and diffusion theory, diffuse optical tomography, Monte Carlo modeling and photon transport in biological tissue,

ballistic light imaging, time domain, frequency domain and continuous light measurement systems, optical coherence tomography, and photoacoustic tomography.

### **5302. Biochemical Engineering for Biomedical Engineers**

Three credits. Not open for credit to students who have passed BME 3300.

Introduction to chemical reaction kinetics; enzyme and fermentation technology; microbiology, biochemistry, and cellular concepts; biomass production; organ analysis; viral dynamics.

### **5339. Introductory Ergonomics for Biomedical Scientists and Engineers**

Three credits. Prerequisite: BME 5600. Recommended preparation: BME 3600 and CE 3110.

This problem-based course begins with a work-related overview of the design strengths and limitations of human anatomy and physiology (molecular, tissue and systems levels) and the contribution of work/worker mismatches to the development of disease. Measurement of the response of these biological tissues and systems to work-related stressors is examined, to define the mechanism and presentation of musculoskeletal disorders. Addresses physiological and anatomical damage due to biomechanical, psychosocial and work organization stressors and explores the range of possible control strategies of interest to the engineer and public health practitioner. To measure presence and levels of risk factors, students will be introduced to the use of laboratory techniques (e.g., EMG, digital motion capture, force cells) as well as field methods used in ergonomic work-site assessment, ranging from simple check-lists (geared towards worker-based interventions), through detailed time/motion studies, self-report effort scales, epidemiological instruments, and psychosocial and organizational measurement tools. A research project is required.

### **5341. Exposure Assessment in Ergonomics**

Three credits. Prerequisite: BME 5339.

The goal of the course is to develop a broad understanding of ergonomic risk factors, knowledge of the measurement modalities available for characterizing workplace risk, and an appreciation of the advantages and disadvantages of each modality. Students will be introduced to the use of laboratory techniques (EMG, videotaping and digitization, digital motion capture, force cells, accelerometry and exercise physiology). They will also be instructed in methods used in ergonomic work-site assessment, ranging from simple checklists (geared towards worker-based interventions), through detailed time/motion studies, self-report effort scales, epidemiological instruments, and psychosocial and organizational measurement tools. The grade will depend on completion of a laboratory-based, field or epidemiological project.

### **5500. Clinical Instrumentation Systems**

Three credits. Recommended preparation: ECE 2001W; BME 3400 and 3500.

Analysis and design of transducers and signal processors; measurements of physical, chemical, biological, and physiological variables; special purpose medical instruments, systems design,

storage and display, grounding, noise, and electrical safety. These concepts are considered in developing devices used in a clinical or biological environment.

### **5600. Human Biomechanics**

Three credits. Prerequisite: Instructor consent. Recommended preparation: BME 3600W.

Applies principles of engineering mechanics in the examination of human physiological subsystems such as the musculoskeletal system and the cardiovascular system. Topics drawn for biosolid mechanics, biofluids, and biodynamics, the viscoelastic modeling of muscle and bone, non-Newtonian fluid rheology, blood flow dynamics, respiratory mechanics, biomechanics of normal and impaired gait, and sport biomechanics.

### **5700. Biomaterials and Tissue Engineering**

(Also offered as MEDS 5313 and MSE 5700.) Three credits. Prerequisite: Instructor consent. Recommended preparation: BME 3700.

A broad introduction to the field of biomaterials and tissue engineering. Presents basic principles of biological, medical, and material science as applied to implantable medical devices, drug delivery systems and artificial organs.

### **5800. Bioinformatics**

Three credits. Recommended preparation: BME 4800 (or equivalent).

Advanced mathematical models and computational techniques in bioinformatics. Topics covered include genome mapping and sequencing, sequence alignment, database search, gene prediction, genome rearrangements, phylogenetic trees, and computational proteomics.

### **6086. Special Topics in Biomedical Engineering**

Variable (1-6) credits. May be repeated for a total of 12 credits.

Classroom and/or laboratory courses in special topics as announced in advance for each semester.

### **6094. BME Graduate Seminar**

One credit. May be repeated for a total of 10 credits.

Presentations will be given by invited speakers from outside, faculty members, and student presenters on current research topics in biomedical engineering.

### **6110. Computational Neuroscience**

Three credits. Prerequisite: Instructor consent.

Explores the function of single neurons and neural systems by the use of simulations on a computer. Combines lectures and classroom discussions with conducting computer simulations. The simulations include exercises and a term project.

### **6120. Neuronal Information Processing and Sensory Coding**

Three credits. Prerequisite: BME 5100. Not open for credit to students who have passed ECE 6311.

Processing, transmission, and storage of information in the central and peripheral nervous systems. Mechanisms of signal generation, transmission and coding by neurons and dendrites. Analysis of invertebrate and vertebrate visual and auditory systems, including: mechanisms of neurosensory transduction, coding, and signal-to-noise ratio enhancement. Neural spatio-temporal filters for feature extraction and pattern recognition. Information theoretic analysis of signal encoding

and transmission in the nervous system. This course assumes a background in linear systems and feedback control systems.

### **6125. Digital Image Processing**

(Also offered as ECE 6125.) Three credits.

Problems and applications in digital image processing, two-dimensional linear systems, shift invariance, 2-D Fourier transform analysis, matrix Theory, random images and fields, 2-D mean square estimation, optical imaging systems, image sampling and quantization, image transforms, DFT, FFT, image enhancement, two-dimensional spatial filtering, image restoration, image recognition, correlation, and statistical filters for image detection, nonlinear image processing, and feature extraction.

### **6126. Fundamentals of Optical Imaging**

(Also offered as ECE 6126.) Three credits.

Learning optical imaging fundamentals. Topics include review of two-dimensional linear system theory; scalar diffraction theory, wave optics, Fresnel and Fraunhofer diffraction; imaging properties of lenses; image formation; optical resolution in imaging, frequency analysis of optical imaging systems; imaging with coherent and incoherent light sources, coherent transfer function; optical transfer function, point spread function, fundamentals of microscopy, two-dimensional spatial filtering; coherent optical information processing; frequency-domain spatial filter synthesis; holography.

### **6140. Cellular Systems Modeling**

Three credits. Prerequisite: BME 5600.

Cellular response to drugs and toxins, as well as normal cell processes such as proliferation, growth and motility often involve receptor-ligand binding and subsequent intracellular processes. Focuses on mathematical formulation of equations for key cellular events including binding of ligands with receptors on the cell surface, trafficking of the receptor-ligand complex within the cell and cell signaling by second messengers. Background material in molecular biology, cell physiology, estimation of parameters needed for the model equations from published literature and solution of the equations using available computer programs are included. Examples from the current literature of cell processes such as response to drugs and proliferation will be simulated with the model equations.

### **6143. Pattern Recognition and Neural Networks**

(Also offered as ECE 6143.) Three credits.

Review of probability and stochastic processes. Statistical pattern recognition. Nonlinear signal processing and feature extraction. Correlation filters. Metrics for pattern recognition. Bayesian classifiers. Minimum probability of error processors. Supervised and unsupervised learning. Perception learning methods. Multilayer neural networks. Applications to security and encryption.

### **6160. Computational Genomics**

Three credits. Prerequisite: CSE 5800 or BME 5800.

Advanced computational methods for genomic data analysis. Topics covered include motif finding, gene expression analysis, regulatory network inference, comparative genomics, genomic sequence variation and linkage analysis.

**6180. Computational Foundations of Systems Biology**

Three credits. Not open for credit to students who have passed BME 4985.

Focuses on studying dynamic and intelligent features (e.g., adaptation and robustness) of biological systems such as gene networks. Emphasizes the tools and methods of computational systems biology come from other computation-oriented fields such as computational physics, digital signal processing, control engineering, and digital logic. Programming using MATLAB, LabVIEW, and C# in the context of modeling, analyzing, estimating, and controlling real biological systems. Through a variety of assignments and projects, students will obtain a deeper understanding of physical and engineering principles applied to biological systems. Students will also read and present journal articles on topics covered in class, which will expose them to interdisciplinary research and views.

**6400. Biomedical Imaging**

Three credits. Prerequisite: Instructor consent. Recommended preparation: BME 3400 or ECE 3111.

Fundamentals of detection, processing and display associated with imaging in medicine and biology. Topics include conventional and Fourier optics, optical and acoustic holography, thermography, isotope scans, and radiology. Laboratory demonstrations will include holography and optical image processing. Assumes a background in linear systems.

**6420. Medical Imaging Systems**

Three credits. Prerequisite: BME 5500 or BME 6500.

This course covers imaging principles and systems of x-ray, ultrasound, optical tomography, magnetic resonance imaging, positron emission tomography.

**6450. Optical Microscopy and Bio-imaging**

(Also offered as MEDS 6450.) Three credits.

Presents the current state of the art of optical imaging techniques and their applications in biomedical research. The course materials cover both traditional microscopies (DIC, fluorescence etc.) that have been an integrated part of biologists' tool-box, as well as more advance topics, such as single-molecule imaging and laser tweezers. Four lab sessions are incorporated in the classes to help students to gain some hand-on experiences. Strong emphasis will be given on current research and experimental design.

**6500. Biomedical Instrumentation I**

Three credits. Prerequisite: BME 5500 or instructor consent.

Origins of bioelectric signals; analysis and design of electrodes and low noise preamplifiers used in their measurement. Statistical techniques applied to the detection and processing of biological signals in noise, including the treatment of nerve impulse sequences as stochastic point processes. Methods of identifying the dynamic proper ties of biosystems. Assumes a background in linear systems and electronics.

**6510. Biomedical Instrumentation Laboratory**

Three credits. Prerequisite: Instructor consent.

Experimental investigation of electrodes, transducers, electronic circuits and instrumentation systems used in biomedical research and clinical medicine.

**6520. Biosensors**

Three credits. Prerequisite: BME 5500 or instructor consent.

Principles and design of acoustic imaging transducers, and force, pressure and hearing sensors. Covers also optical biosensors including oxygen monitoring sensors, glucose sensors and optical sensors used in imaging.

**6620. Biosolid Mechanics**

Three credits. Prerequisite: BME 5600. Recommended preparation: BME 3600 and CE 3110.

Mechanical behavior of biological solids. Applications of the theories of elasticity, viscoelasticity, and poroelasticity to bones, ligaments and tendons, skeletal muscle, and articular cartilage. Axial, bending, shearing and torsional loadings. Bone morphology and growth. Biphasic theory. Failure theories. Research paper. Topics may be modified slightly to accommodate student interests.

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## Biostatistics (BIST)

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**5099. Investigation of Special Topics**

(Also offered as STAT 5099.) Variable (1-6) credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required. May be repeated for credit.

**5215. Statistical Consulting**

(Also offered as STAT 5215.) Three credits. Prerequisite: STAT 5315, 5505, 5605 and 5725; or instructor consent.

Applied inference for academia, government, and industry: ethical guidelines, observational studies, surveys, clinical trials, designed experiments, data management, aspects of verbal and written communication, case studies.

**5225. Data Management and Programming in R and SAS**

(Also offered as STAT 5225.) Three credits. Prerequisite: STAT 5505 and 5605; or instructor consent.

Creation and management of datasets for statistical analysis: software tools and databases, user-defined functions, importing/exporting/manipulation of data, conditional and iterative processing, generation of reports.

**5361. Statistical Computing**

(Also offered as STAT 5361.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Use of computing for statistical problems; obtaining features of distributions, fitting models and implementing inference. Basic numerical methods, nonlinear statistical methods, numerical integration, modern simulation methods.

**5505. Applied Statistics I**

(Also offered as STAT 5505.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Exploratory data analysis: stem-and leaf plots, Box-plots, symmetry plots, quantile

plots, transformations, discrete and continuous distributions, goodness of fit tests, parametric and non-parametric inference for one sample and two sample problems, robust estimation, Monte Carlo inference, bootstrapping.

**5515. Design of Experiments**

(Also offered as STAT 5515.) Three credits. Prerequisite: STAT 5005 or graduate student in Biostatistics. Not open for credit to students who have passed STAT 3515Q.

One way analysis of variance, multiple comparison of means, randomized block designs, Latin and Graeco-Latin square designs, factorial designs, two-level factorial and fractional factorial designs, nested and hierarchical designs, split-plot designs.

**5525. Sampling Theory**

(Also offered as STAT 5525.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Sampling and nonsampling error, bias, sampling design, simple random sampling, sampling with unequal probabilities, stratified sampling, optimum allocation, proportional allocation, ratio estimators, regression estimators, super population approaches, inference in finite populations.

**5535. Nonparametric Methods**

(Also offered as STAT 5535.) Three credits. Not open to students who have passed STAT 4875.

Theory and applications of statistical methods for analyzing ordinal, non-normal data: one and multiple sample hypothesis testing, empirical distribution functions and applications, order statistics, rank tests, efficiency, linear and nonlinear regression, classification.

**5585. Mathematical Statistics I**

(Also offered as STAT 5585.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Introduction to probability theory, transformations and expectations, moment generating function, discrete and continuous distributions, joint and marginal distributions of random vectors, conditional distributions and independence, sums of random variables, order statistics, convergence of a sequence of random variables, the central limit theorem.

**5605. Applied Statistics II**

(Also offered as STAT 5605.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Analysis of variance, regression and correlation, analysis of covariance, general liner models, robust regression procedures, and regression diagnostics.

**5615. Categorical Data Analysis**

(Also offered as STAT 5615.) Three credits. Prerequisite: STAT 5505 and 5605; or instructor consent.

Statistical analysis of data on a nominal scale: discrete distributions, contingency tables, odds ratios, interval estimates, goodness of fit tests, logistic/probit/complementary log-log regression, Poisson-related regression.

**5625. Introduction to Biostatistics**

(Also offered as STAT 5625.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Rates and proportions, sensitivity, specificity, two-way tables, odds ratios, relative risk, ordered and non-ordered classifications, trends, case-control studies, elements of regression including logistic and Poisson, additivity and interaction, combination of studies and meta-analysis.

#### **5635. Clinical Trials**

(Also offered as STAT 5635.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Basic concepts of clinical trial analysis; controls, randomization, blinding, surrogate endpoints, sample size calculations, sequential monitoring, side-effect evaluation and intention-to-treat analyses. Also, experimental designs including dose response study, multicenter trials, clinical trials for drug development, stratification, and cross-over trials.

#### **5645. Concepts and Analysis of Survival Data**

(Also offered as STAT 5645.) Three credits.

Survival models, censoring and truncation, nonparametric estimation of survival functions, comparison of treatment groups, mathematical and graphical methods for assessing goodness of fit, parametric and nonparametric regression models.

#### **5655. Epidemiology**

(Also offered as STAT 5655.) Three credits. Prerequisite: Open to graduate students in the Department of Statistics; others with consent.

The statistical study of health and illness in human and veterinary populations: epidemiological study designs, measures of disease frequency/effect/potential impact, selection and information biases, confounding, stratified analysis.

#### **5665. Applied Multivariate Analysis**

(Also offered as STAT 5665.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Multivariate normal distributions, inference about a mean vector, comparison of several multivariate means, principal components, factor analysis, canonical correlation analysis, discrimination and classification, cluster analysis.

#### **5675. Bayesian Data Analysis**

(Also offered as STAT 5675.) Three credits. Prerequisite: STAT 5585 and 5685; or instructor consent.

Theory of statistical inference based on Bayes' Theorem: basic probability theory, linear/nonlinear, graphical, and hierarchical models, decision theory, Bayes estimation and hypothesis testing, prior elicitation, Gibbs sampling, the Metropolis-Hastings algorithm, Monte Carlo integration.

#### **5685. Mathematical Statistics II**

(Also offered as STAT 5685.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

The sufficiency principle, the likelihood principle, the invariance principle, point estimation, methods of evaluating point estimators, hypotheses testing, methods of evaluating tests, interval estimation, methods of evaluating interval estimators.

#### **5705. Statistical Methods in Bioinformatics**

(Also offered as STAT 5705.) Three credits. Prerequisite: STAT 5505 and 5585; or instructor consent.

Statistical methods and software tools for the analysis of biological data: sequencing methods; gene alignment methods; expression analysis; evolutionary models; analysis of proteomics, metabolomics, and methylation data; pathway analysis; gene network analysis.

#### **5725. Linear Statistical Models**

(Also offered as STAT 5725.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Linear and matrix algebra concepts, generalized inverses of matrices, multivariate normal distribution, distributions of quadratic forms in normal random vectors, least squares estimation for full rank and less than full rank linear models, estimation under linear restrictions, testing linear hypotheses.

#### **5815. Longitudinal Data Analysis**

(Also offered as STAT 5815.) Three credits. Prerequisite: STAT 5505 and 5605; or instructor consent.

Statistical theory and methodology for data collected over time in a clustered manner: design of experiments, exploratory data analysis, linear models for continuous data, general linear models for discrete data, marginal and mixed models, treatment of missing data.

#### **5825. Applied Time Series**

(Also offered as STAT 5825.) Three credits. Prerequisite: Open only to Biostatistics graduate students; instructor consent required.

Introduction to prediction using time-series regression methods with non-seasonal and seasonal data. Smoothing methods for forecasting. Modeling and forecasting using univariate autoregressive moving average models.

#### **6494. Seminar in Applied Statistics**

(Also offered as STAT 6494.) Variable (1-6) credits. Prerequisite: Open only to Biostatistics graduate students, instructor consent required. May be repeated for credit.

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### **Business Administration (BADM)**

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#### **5103. Statistics and Spreadsheet Modeling**

Three credits. Not open for credit to students who have passed BADM 5180, 5181, or OPIM 5103.

Covers classical inference procedures and basic statistical concepts often essential to interpretation of business data. Students will learn to ask probing questions about the specifics of data and statistical techniques, to understand the conditions for drawing reliable inferences, and to assess the validity of statistical evidence. Topics include: discrete and continuous random variables, sampling, confidence intervals and hypothesis testing. Builds students' abilities for effective quantitative business analysis and communication, using a spreadsheet program such as Excel. Spreadsheet modeling uses such as regression, forecasting, simulation and decision models will be covered, in different functional areas including finance, marketing, operations, and management.

#### **5151. US Capital Markets and Institutions**

Zero credits. Prerequisite: Open only to MBA students, others with consent.

Designed for students who have limited experience and knowledge of US capital markets and business institutions.

#### **5170. Foundations of Economic Environments**

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open to students who have passed BLAW 5182.

Provides students with applied knowledge of key economic and psychological concepts that ground interactions among individuals and organizations in the global business environment.

#### **5180. Core Statistics**

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open to students who have passed BLAW 5182.

Covers classical inference procedures and basic statistical concepts often essential to interpretation of business data. Students will learn to ask probing questions about the specifics of data and statistical techniques, to understand the conditions for drawing reliable inferences, and to assess the validity of statistical evidence. Topics include: discrete and continuous random variables, sampling, confidence intervals and hypothesis testing.

#### **5181. Spreadsheet Modeling for Business Analysis**

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open to students who have passed BLAW 5182.

Builds students' abilities for effective quantitative business analysis and communication, using a spreadsheet program such as Excel. Spreadsheet modeling uses such as regression, forecasting, simulation and decision models will be covered, in different functional areas including finance, marketing, operations, and management.

#### **5182. Communicating for Impact A**

1.5 credits. Prerequisite: Open only to MBA students, others with consent.

Creating value for an organization depends on the ability to effectively translate expertise into business results. This requires the ability to connect with and communicate with others across the organization, to gather information to identify challenges and opportunities, to frame these in ways that build momentum for change, to work with people across functional and geographic lines to develop solutions, to gain buy-in for those solutions in a form that resonates with stakeholders, and to implement solutions in ways that are sustainable for the people they touch. This course focuses on understanding this consultative process and improving student performance in the integrative skills on which it depends. These skills include oral and written communications, effective collaboration in a variety of environments, adapting communications and implementation approaches to different audiences, and improving the ability to perceive, evaluate, and manage emotions.

#### **5183. Communicating for Impact B**

1.5 credits. Prerequisite: BADM 5182.

Continuation of BADM 5182.

#### **5190. Sustainability in the Global Business Environment**

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open to students who have passed BLAW 5182.

Examines approaches to meeting complementary and competing needs of shareholders, customers, employees and communities through the design and maintenance of global value chains. Students will assess alternative business models and management practices designed to enhance sustainability for an increasingly global array of stakeholders. Specific topics may include social enterprise management, environmental strategy, corporate social responsibility, serving “Base of the Pyramid” markets, socially responsible investing alongside issues relating to social, environmental and economic ecosystems.

**5254. Managing the Future of Social Enterprise**  
(Also offered as BLAW 5254 and HRTS 5254).  
Three credits.

Developing and managing market-based approaches to global human rights and social issues. Strategizing how companies create value both for society and business, including role of for-profit businesses as agents for positive social impact in changing legal, regulatory, policy, and market environments. Regulatory and business strategies that serve markets and promote long-term economic viability, sustainability, and human rights. Managerial perspectives on social innovation, statutory benefit corporations, corporate social certifications, social investment, shared value, strategic philanthropy and business opportunities serving emerging markets.

**5310. Experiential Learning Collaborative Project**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Graduate elective focusing on the real-life projects run by the Experiential Learning Collaborative for the client-partners including corporations, startups, government, and non-for-profit organization. It involves scoping a project, conducting industry research, development of the deliverables, writing reports, and presenting solutions to the client-partner executive team. Student teams work in the competitive environment under the guidance of an experienced Project Mentor (academic or industry practitioner). Open to graduate students who pass a personal interview and are accepted to the project.

**5311. Experiential Learning Collaborative Advanced Project**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Graduate elective focusing on the advanced real-life projects run by the Experiential Learning Collaborative for the client-partners including corporations, startups, government, and non-for-profit organization. It involves scoping a project, conducting industry research, development of the deliverables, writing reports, and presenting solutions to the client-partner executive team. Student teams work in the competitive environment under the guidance of an experienced Project Mentor (academic or industry practitioner). Open to graduate students who pass a personal interview and are accepted to the advanced project.

**5320. Innovation Accelerator I: Evaluation of New Ventures -- Business Process**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

This practicum provides students hands on experience working with the founders of a high-

tech entrepreneurial venture. Students, working in a team, are empowered to act as the CEO of the start-up venture focusing on developing innovative and implementable strategic solutions to a defined mission-critical problem faced by the venture. Students develop an expert knowledge with respect to the venture’s industry, markets, products, competitors, etc. that serve as a foundation for recommending evidence-based transformational solutions. Emphasis is placed on skill acquisition such that students can effectively frame the problem, research it and acquire 360 degree views/voices of the issues.

**5321. Innovation Accelerator II: New Venture Analytics**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Practicum provides the students with hands on experience working with the founders of a high-tech entrepreneurial venture. Under a faculty mentor, the lab provides the students with hands-on experience collecting both primary and secondary data. Students acquire skills related to identifying targeted survey populations, the development of unambiguous survey questions, as well as best methods for survey implementation. Furthermore, students learn how to analyze the resultant data, combine it with other secondary research, extract relevant, non-duplicative findings, and develop evidence-based conclusions and strategic recommendations/solutions for the client venture.

**5330. SCOPE I: Social Entrepreneurship Processes**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Practicum provides students with hands on experience in working with social entrepreneurs at work in start-up or existing organizations (private, public or not-for-profit). Experiences may include helping organizations identify social needs, evaluate alternative methods for improving social conditions and develop programs to implement solutions. Meaningful social entrepreneurship can be local in scope, or contribute to the development of cities, regions, nations or even be global in its reach. Under a faculty mentor, students work on projects which will provide the opportunity to make a positive difference by applying their skills and training to address critical social needs.

**5331. SCOPE II: Social Innovation Processes**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Practicum examines how innovation by organizations can be used to develop responses to social problems. Social innovators employ “entrepreneurial skills,” such as finding opportunities, inventing new approaches, securing and focusing resources to meet social needs and managing risk, in the service of creating social value. We see social innovation, defined as innovative, social value creation, occurring within or across nonprofit, governmental, and for profit organizations. Under a faculty mentor, students in this course will work with an organization to help it improve people’s lives through the development of innovative programs to meet social needs.

**5350. Fund Management I**

Three credits. Prerequisite: FNCE 5101; instructor consent required. Corequisite: FNCE 5202.

First part of a two-part Fund Management course. Develops the objectives and goals, the process, and the procedure for execution for management of funds in conformity with the SMF Prospectus. The purpose is to train students in the art of asset allocation, security selection, portfolio construction, risk management, preparing analysts’ reports for trade recommendations, monitoring of positions, and preparing reports for presentation to the Investment Advisory Board.

**5351. Fund Management II**

Three credits. Prerequisite: FNCE 5101 and BADM 5350; instructor consent required. Corequisite: FNCE 5202.

Second part of a two-part Fund Management course. In addition to all the activities in the first part during fall, this course focuses on portfolio management, performance evaluation, attribution analysis, development of various trading and risk management strategies, and technical analysis. Students prepare the final annual report for presentation to the UConn Foundation.

**5894. Special Topics**

Variable (1-9) credits. Prerequisite: Open only to MBA students, others with consent. May be repeated for a maximum of 12 credits.

Special topics.

**6201. Introduction to Research and Teaching**

One credit. Prerequisite: Open only to Ph.D. students in the School of Business.

Introduces students to important dimensions of an academic career. The role and importance of research and teaching is stressed with emphasis on philosophy of science, as well as appreciation of research in other business administration areas of concentration. Teaching methods and values in higher education are covered. Guest speakers discuss research in their areas. Practical aids such as how to write a research proposal and how to manage a dissertation are covered.

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## Business Law (BLAW)

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**5175. Business, Law, and Ethics in Modern Society**

Three credits. Prerequisite: Open only to MBA students. Not open to students who have passed BLAW 5182.

The formulation, interpretation, and application of law to business. Incorporates the study of ethical issues that arise in contemporary business settings, including professional conduct and corporate social responsibility. Major areas of legal regulation to which businesses are subject, including tort liability, contract law, partnership and corporate law, employment and labor law, intellectual property law, environmental regulation and sustainability, and financial regulation. Emphasis on active, experiential application of legal reasoning and analysis and on the global and comparative dimensions of legal and ethical issues.

**5181. Government and the Legal Environment of Business**

1.5 credits. Prerequisite: Open only to MBA students. Not open to students who have passed MKTG 5182.

Introduces the essential functions and roles of the legal environment of business. The fundamentals of the legal and ethical environment of business

are explored, including legal institutions and legal process. Intentional torts and negligence, common, statutory and administrative law, and alternative dispute resolution. Selected topics in the legal environment of business are also examined, including employment law, securities law, and intellectual property.

#### **5182. Business Responsibility, Accountability and Ethics**

1.5 credits. Prerequisite: BLAW 5181.

Examines the essentials of legal astuteness, enabling students to ensure regulatory compliance, manage legal counsel, minimize liability and reach value-added business decisions in an increasingly complex regulatory environment. Examines the leading societal issues relevant to a firm's responsibilities toward its business environment. Topics covered include fairness in the workplace, corporate governance, bribery and corruption, corporate responsibility, and firm-regulator relations. Pillars of responsible business conduct are also introduced in order to develop to values-driven decision-making skills in the social and ethical environment of business.

#### **5220. Employment Law**

Three credits.

Examines federal and state laws regulating the employer-employee relationship and the dynamics of the contemporary workplace, as well as different legal forums and regulatory mechanisms impacting U.S. employment law. Introduces students to a wide range of problems involving hiring, firing, discrimination, harassment, and accommodation, emphasizes the importance of managing employer-employee relationships to resolve disputes and grow productivity, and addresses the prevention of claims and mitigation of legal risk in the context of business drivers, operational strategy, and the economic realities of today's workplace.

#### **5254. Managing the Future of Social Enterprise**

(Also offered as BADM 5254 and HRTS 5254.) Three credits.

Developing and managing market-based approaches to global human rights and social issues. Strategizing how companies create value both for society and business, including role of for-profit businesses as agents for positive social impact in changing legal, regulatory, policy, and market environments. Regulatory and business strategies that serve markets and promote long-term economic viability, sustainability, and human rights. Managerial perspectives on social innovation, statutory benefit corporations, corporate social certifications, social investment, shared value, strategic philanthropy and business opportunities serving emerging markets.

#### **5660. International Business Law**

Three credits. Prerequisite: Open only to MBA students, others with consent.

Examines major issues in international law by focusing primarily on the extensive legal and ethical environment of the modern international marketplace. Key topics to be explored include jurisdiction, international dispute resolution, contract law and the international sale of goods, intellectual property, employment, and environmental issues. Will also help students understand key institutions in the international legal

system and learn about current legal topics related to international trade and foreign investment.

#### **5680. Securities Law**

Three credits. Prerequisite: Open only to MBA students, others with consent.

Examines U.S. federal securities law, the Securities and Exchange Commission and other regulatory bodies to provide knowledge of the rules and institutions of securities regulation as well as related policy issues and strategic considerations by market participants. Emphasis on the legal and ethical responsibilities of corporate managers and executives, accountants, underwriters, and broker-dealers, and on the global and transnational aspects of securities transactions. The Securities Act of 1933, the Securities Exchange Act of 1934, and reforms implemented by the Sarbanes-Oxley Act and the Dodd-Frank Wall Street Reform and Consumer Protection Act are covered.

#### **5750. Ethics and Compliance in the Global Organization**

Three credits. Prerequisite: Open to MBA and non-degree business students, others with instructor consent.

Examines the compliance function from an ethical and organizational perspective. Incorporates the study of compliance in contemporary business settings. The multifaceted nature of compliance will be examined as well as how compliance leaders introduce and sustain an ethical culture of integrity in the enterprise. Also examines key compliance processes and explore why certain compliance initiatives succeed or fail. Compliance will also be viewed from a global perspective, incorporating ethical, legal, and cultural challenges and opportunities in a global compliance program.

#### **5894. Seminar**

Variable (1-3) credits. Prerequisite: Open only to MBA students, others with consent. Not open for credit to students who have passed BLAW 5182. May be repeated for a maximum of 12 credits.

Investigation and discussion of special topics in law.

#### **5895. Special Topics in Business Law**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Faculty-student interaction on a one-to-one basis involving independent study of specific areas of law. Emphasis, selected by the student, may be on theoretical or applied aspects. A written report is required.

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## **Chemical Engineering (CHEG)**

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#### **5301. Chemical Engineering Thermodynamics I**

Three credits.

An advanced study of classical thermodynamics with emphasis on phase and chemical equilibria and applications to the chemical process industries. Kinetic theory and statistical thermodynamics with emphasis on the prediction and correlation of physical and chemical properties of gases and liquids, including mixtures. Theory and application of flames, plasmas, and shock waves.

#### **5302. Chemical Engineering Thermodynamics II**

Three credits.

An advanced study of classical thermodynamics with emphasis on phase and chemical equilibria and applications to the chemical process industries. Kinetic theory and statistical thermodynamics with emphasis on the prediction and correlation of physical and chemical properties of gases and liquids, including mixtures. Theory and application of flames, plasmas, and shock waves.

#### **5315. Transfer Operations I**

Three credits.

An advanced study of momentum, heat and mass transfer with application to complex problems. Cartesian tensors, non-Newtonian flow, statistical theory of turbulence. Mass transfer in multicomponent systems and with chemical reaction. Mass transfer in drops and bubbles; two-phase flow and fluidization.

#### **5321. Reaction Kinetics I**

Three credits.

Chemical kinetics and reactor design. An advanced study of chemical reaction engineering with emphasis on catalysis. Applications to stirred-tanks, fixed-bed, and fluidized bed reactors.

#### **5336. Optimization**

Three credits. Prerequisite: Department consent.

Advanced topics in optimization such as linear and nonlinear programming, mixed-integer linear and nonlinear programming, deterministic and stochastic global optimization, and interval global optimization. Example applications drawn from engineering.

#### **5351. Polymer Physics**

Three credits.

Modern concepts relating to glassy, rubbery and organized states of bulk polymers. Considers rubber elasticity, glass-to-rubber transitions, networks, elements of crystallization, blends and interfacial phenomena.

#### **5352. Polymer Properties**

(Also offered as POLY 5352.) Three credits.

Interrelationships between solid state structure, dynamics, and mechanical properties of non-crystalline and semi-crystalline polymers. Considers polymer viscoelasticity, diffusion, failure mechanism, and elementary polymer rheology.

#### **5358. Composite Materials**

Three credits.

An introduction to the mechanical properties of fiber reinforced composite materials. Included are discussions of the behavior of unidirectional composites, short fiber composites and laminates. Special topics such as fatigue, fracture and environmental effects are also included.

#### **5363. Electrochemical Engineering**

Three credits. Prerequisite: Instructor consent.

Principles underlying electrochemical processes. Transformation of chemical and electrical energy. Applications of fundamental electrochemical laws to industrial processes, energy conversion, and electrometallurgical operations.

#### **5367. Polymer Rheology**

(Also offered as POLY 5367.) Three credits.

Analysis of the deformation and flow of polymeric materials. Topics include non-Newtonian flow, viscoelastic behavior and melt fracture with application to polymer processing.

**5373. Biochemical Engineering**

Three credits.

Principles and design of processes involving biochemical reactions. Nature of biological materials, biochemical kinetics, heat and mass transfer, application to fermentation and other biological processes.

**5393. Seminar**

Zero credits.

**5394. Seminar**

Zero credits.

**5395. Investigation of Special Topics**

Variable (1-3) credits. May be repeated for a total of 12 credits.

Designed for special topics, or for individual students who desire to pursue investigations in a specialized field.

**5399. Independent Study**

Variable (1-3) credits. Instructor consent required. May be repeated for a total of six credits.

Independent study under the supervision of a Chemical Engineering faculty member.

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## Chemistry (CHEM)

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**5300. Independent Study**

Variable (1-3) credits. Prerequisite: Instructor consent required. May be repeated for a total of 12 credits.

**5310. Seminar**

One credit. May be repeated for a total of three credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Reports and discussion of topics of current interest in a variety of fields of chemistry.

**5324. Advanced Inorganic Chemistry I**

Three credits.

Synthetic methods in inorganic chemistry; the application of physical methods to the investigation of inorganic compounds.

**5325. Advanced Inorganic Chemistry II**

Three credits. Prerequisite: CHEM 5324.

In-depth study of general principles of inorganic chemistry; the structure of the elements and of inorganic compounds; group theory; different approaches to understanding the chemical bond.

**5326. Advanced Inorganic Chemistry III**

Three credits. Prerequisite: CHEM 5325.

Main group and transition metal compounds with inorganic and organic ligands; the study of the transition metals is in preparation for CHEM 5327.

**5327. Advanced Inorganic Chemistry IV**

Three credits. Prerequisite: CHEM 5326.

Transition metal chemistry; organometallic and coordination compounds of the transition elements, including the lanthanides and actinides; selected topics in bioinorganic chemistry.

**5336. Electroanalytical Chemistry**

Three credits.

A study of the theoretical and practical basis for electroanalytical methods. Topics include voltammetric methods of analysis (including polarography, cyclic voltammetry, rotating disk

voltammetry, pulse and square-wave methods, and stripping analysis), coulometric, and chronoamperometric methods. Recent advances using micro- and modified electrodes, thin-layer and flow cells, electrochemical sensors and detectors, and bioelectrochemistry may be included.

**5337. Optical Methods of Analysis**

Three credits.

A discussion of fundamental principles, instrumentation and applications of some spectroscopic techniques of analytical chemistry including Raman spectroscopy, molecular fluorescence spectroscopy, atomic spectroscopy.

**5338. Separation Methods**

Three credits.

A study of the theoretical and practical basis for modern separation methods. Topics to be discussed include the various methods dealing with gas-liquid, liquid-liquid, liquid-solid, gas-solid, ion-exchange, size exclusion, chromatography, electrophoresis, and mass spectrometry.

**5340. Electronic Interpretation of Organic Chemistry**

One credit.

Approaches to writing organic reaction mechanisms.

**5341. Advanced Organic Chemistry**

Three credits.

Review of the fundamentals of bonding, stereochemistry and conformations and basic reactions from undergraduate organic chemistry. These fundamental principles will then be elaborated to include more advanced concepts of reactions and reactivity.

**5343. Organic Reactions**

Four credits.

Nomenclature. Classes of compounds. A focus upon those reactions in which C-C bonds are formed. Emphasis on the fundamentals of each reaction, their utility and applications. A background of functional group exchanges; reaction control by steric, electronic, and topological considerations.

**5344. Concepts in Organic Chemistry**

Three credits. Prerequisite: CHEM 5343.

Structure and mechanism. Such topics as chemical bonding, stereochemistry, conformation, molecular orbital theory and applications, acids and bases, and study of organic reaction mechanisms, including kinetics, substitutions, rearrangements and photochemical reactions.

**5345. Determination of Organic Structures**

Three credits. Prerequisite: CHEM 5343.

Structural problem solving using fundamental data including spectroscopic and wet chemical techniques.

**5347. Organic Synthesis**

Three credits. Prerequisite: CHEM 5343 and 5344.

An investigation of efficient strategies for the synthesis of natural and unnatural organic molecules. Topics include: retrosynthetic analysis, synthetic strategies, common carbon-carbon bond formation reactions, multiple bond disconnection strategies (applications of pericyclic reactions), organometallic coupling reactions, radical and carbene reactions in organic synthesis, strategies

to construct carbocyclic and heterocyclic ring systems.

**5350. Advanced Physical Chemistry I**

Three credits. Prerequisite: instructor consent required. Not open to students who have passed CHEM 5351, 5352, 5353, or 5356.

Thermodynamics, quantum mechanics and reaction dynamics, including enthalpy, entropy, free energy, equilibrium, quantum behavior of electrons and molecules, atomic and molecular spectroscopy, and theories of reaction rates.

**5351. Quantum Chemistry I**

Three credits.

Concepts of the quantum theory starting with an historical introduction and proceeding to the formulation of the Schrödinger equation and its exact solutions. Other topics include group theory, angular momentum, and approximate methods with applications to atomic and molecular structure and spectroscopy.

**5352. Quantum Chemistry II**

Three credits. Prerequisite: CHEM 5351.

Selected topics in quantum chemistry, building on the concepts developed in CHEM 5351.

**5353. Chemical Kinetics**

Three credits.

Empirical and theoretical treatment of reaction rates. Experimental methods and treatment of data. Simple kinetic forms. Deduction of reaction mechanisms. Reaction energetics. Theories of elementary reaction rates. Diffusion. Homogeneous and heterogeneous catalysis. Extrakinetic probes of mechanism.

**5356. Statistical Mechanics**

Three credits.

Equilibrium properties of macroscopic systems from a molecular point of view.

**5360. Biological Chemistry I**

Three credits. Prerequisite: Instructor consent.

Recent advances in understanding the mechanisms of chemical processes in biological systems. Chemical perspectives or problems of biological significance at the interfaces of the various divisions of chemistry.

**5361. Biological Chemistry II**

Variable (1-3) credits. Prerequisite: Instructor consent.

Selected topics in Biological Chemistry. Building on the concepts developed in CHEM 5360.

**5370. Environmental Chemistry I**

Three credits.

Sources, transport, effects, fate, analytical chemistry, monitoring and management of chemical species; chemical principles, equilibria and reactions. Water and atmospheric pollution; acid rain, global warming, ozone.

**5371. Environmental Chemistry II**

Three credits. Prerequisite: CHEM 5370 or 4370.

Inorganic metals and organic chemicals in the environment; energy sources; fossil fuels, nuclear power, fuel cells, and alternatives.

**5380. Polymer Synthesis**

(Also offered as POLY 5380.) Three credits.

Chemistry of the formation of high polymers, including kinetics, mechanisms, and stereochemistry of step growth and addition polymerization. Recent advances in polymer synthesis.

### 5381. Polymer Physical Chemistry

(Also offered as POLY 5381.) Three credits.

A molecular description of the fundamental physico-chemical aspects of polymer solutions and solids. Considers thermodynamics, chain statistics, dynamics, and structure of polymer molecules.

### 5382. Polymer Characterization I

(Also offered as POLY 5382.) Three credits.

Experimental techniques for characterizing polymers on a molecular level, with emphasis on the provision of a working knowledge of instrumental analysis. Experiments include dilute solution viscosity, vapor pressure osmometry, gel permeation chromatography, chemical and spectroscopic analysis.

### 5384. Polymer Characterization II

(Also offered as POLY 5384.) Three credits.

Experimental techniques for characterizing polymers on a macroscopic scale, with emphasis on provision of a working knowledge of instrumental analysis. Experiments include calorimetry, mechanical analysis, surface characterization, and structure determination.

### 5388. Infrared Spectroscopy of Polymers

Three credits.

The nature of the interaction of IR radiation with molecules, modern spectrometer design, non-conventional sampling techniques, and applications to polymer-related problems.

### 5393. Special Topics in Physical Chemistry

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

### 5394. Special Topics in Polymer Chemistry

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

### 5395. Special Topics in Analytical Chemistry

Variable (1-3) credits. May be repeated for a total of 12 credits.

### 5396. Special Topics in Inorganic Chemistry

Variable (1-3) credits. May be repeated for a total of 12 credits.

### 5397. Special Topics in Organic Chemistry

Variable (1-3) credits. Prerequisite: CHEM 5343. May be repeated for a maximum of 12 credits.

### 5398. Variable Topics in Chemistry

Variable (1-3) credits. Prerequisite: open only to graduate students in Chemistry and related areas. May be repeated for a maximum of 12 credits.

Themes applicable to students in all divisions of chemistry.

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## Civil and Environmental Engineering (CE)

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### 5010. Seminar in Structures and Applied Mechanics

Zero credits.

Presentations and discussions contributed by staff, students and outside speakers. Required every semester for all full-time students in the Structures

and Applied Mechanics Area of Concentration in the Civil Engineering Field of Study.

### 5020. Independent Graduate Study in Civil Engineering

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Special problems in civil engineering as arranged by the student with a supervisory instructor of his or her choice.

### 5030. Seminar in Transportation and Urban Engineering

Zero credits.

Extended discussions on presentations contributed by staff, students and outside speakers. Required every semester for all full-time students in the Transportation and Urban Engineering Area of Concentration in the Civil Engineering Field of Study.

### 5090. Advanced Topics in Civil Engineering

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Classroom or laboratory courses as announced for each semester. For independent study see CE 5020.

### 5122. Advanced Mechanics of Materials

Three credits.

Stress and strain, combined stress, and theories of failure. Torsion of non-circular sections. Shear center, unsymmetrical bending, curved flexural members, and beams on elastic foundations. Energy methods. Plane theory of elasticity, plate bending, and pressurized cylinders.

### 5125. Reliability for Engineers

Three credits. Prerequisite: Instructor consent. Recommended preparation: basic knowledge or course taken on statistics and/or random processes.

Fundamentals of reliability analysis. Load and resistance models, first order reliability methods, and probabilistic simulation techniques. Calibration of design codes. System reliability.

### 5128. Elastic Stability

Three credits.

Buckling of elastic and inelastic columns; lateral buckling of beams; buckling of plates, rings and tubes; stability of frames.

### 5130. Numerical Methods in Civil Engineering

Three credits.

Solution of linear and nonlinear systems of equations and algebraic eigenvalue problems. Interpolation, numerical integration, and regression. Ordinary and partial differential equations by finite difference method. Computer programming.

### 5150. Structural Vibrations

Three credits.

Vibrating systems; application to design; discrete and continuous systems, free and forced vibrations; response to periodic and non-periodic loads; analytical and numerical techniques; earthquake loading; response spectra.

### 5151. Experimental Structural Dynamics

Three credits.

Characteristics of random data; vibration test hardware; data acquisition and analysis; and experimental modal analysis and system

identification. Laboratory experiments will be used to enhance understanding of taught concepts.

### 5161. Structural health monitoring and sensors

Three credits.

Concepts and applications of structural health monitoring using sensors. Data acquisition, digital signal processing, random vibration, basic control theory, modal analysis, damage detection algorithms, and decision support system. Experimental methods for structural health monitoring of civil structures.

### 5163. Fracture Mechanics

Three credits.

Focuses on fundamental concepts and applications of fracture mechanics. Topics include linear elastic fracture mechanics, elastic plastic fracture mechanics, computational fracture mechanics, fracture mechanisms in metals and non-metals, fracture testing, dynamic and time-dependent fracture, fatigue crack growth, interfacial fracture, fracture in advanced materials, and engineering applications.

### 5164. Finite Element Methods in Applied Mechanics I

(Also offered as ME 5520.) Three credits. Not open for credit to students who have passed CE 5162.

Formulation of finite elements methods for linear static analysis. Development of two and three dimensional continuum elements, axisymmetric elements, plate and shell elements, and heat transfer elements. Evaluation of basic modeling principles including convergence and element distortion. Applications using commercial finite element programs.

### 5166. Finite Element Methods in Applied Mechanics II

(Also offered as ME 5521.) Three credits.

Formulation of finite elements methods for modal and transient analysis. Development of implicit and explicit transient algorithms. Stability and accuracy analysis. Formulation of finite element methods for material and geometric nonlinearities. Development of nonlinear solution algorithms. Applications using commercial finite element code.

### 5370. Environmental Monitoring

(Also offered as ENVE 5370.) Three credits.

Introduction to complexities and challenges associated with acquisition of information on environmental processes and characteristics of natural systems. Hands-on experience with selection of measurement strategy and sensing technology; sampling network and protocol design; and deployment, acquisition and interpretation of measurements in natural systems.

### 5380. Bridge Structures

Three credits.

Common types of bridges; AASHTO bridge loads; design of composite plate girders; fatigue; design of bridge substructure; design project.

### 5530. Advanced Soil Mechanics

Three credits. Not open for credit to students who have passed CE 4541.

Introduction of soil as a multi-phase material; stress and strain analysis in soil; soil compression and consolidation; shear strength of sand and clay; critical state soil mechanics; advanced topics in

complex constitutive relationships; introduction to fracture mechanics; term paper.

#### **5541. Advanced Soil Mechanics**

Three credits.

Introduction of soil as a multi-phase material; stress and strain analysis in soil; soil compression and consolidation; shear strength of sand and clay; critical state soil mechanics; advanced topics in complex constitutive relationships; introduction to fracture mechanics; term paper.

#### **5542. Earthquake Engineering**

Three credits. Not open for credit to students who have passed CE 4542.

Global tectonics and earthquake sources, seismic wave propagation, strong ground motion analysis, seismic hazards, site effects and liquefaction, seismic load to slopes, retaining structures and foundations, structure response to dynamic loads; term paper.

#### **5543. Advanced Foundation Design**

Three credits.

Soil behavior in retaining systems, shallow foundations, deep foundations.

#### **5549. Soil Shear Strength**

Three credits.

Failure theories for particulate media, plastic equilibrium, laboratory testing and interpretation.

#### **5570. Bituminous Materials**

Three credits.

Properties, performance and design of bituminous materials for highway and airport paving; physical and chemical properties of binders; testing methods; specifications; production and construction.

#### **5610. Advanced Reinforced Concrete Structures**

Three credits.

Behavior and design of reinforced concrete for flexure, shear, torsion, bond, and axial loads; two way slabs; beam-column joints; general flexure theory; seismic considerations; review of design specifications.

#### **5620. Advanced Steel Structures**

Three credits.

Metal plasticity; plastic hinging and plastic analysis of beams; bolted and welded connections; seismic lateral load resisting systems; prequalified moment-resisting connections; blast design considerations for steel structures, term project.

#### **5630. Wood Design**

Three credits.

Physical and mechanical properties of wood. Behavior of wood beams, columns, beam columns, connectors and fasteners; introduction to plywood and glued-laminated members; analysis and design of structural diaphragms and shear walls.

#### **5640. Prestressed Concrete Structures**

Three credits.

Analysis, design, and behavior of pretensioned and post-tensioned concrete; simple and continuous span structures; time dependent behavior; review of design specifications.

#### **5650. Structural Health Monitoring and Sensors**

Three credits.

Concepts and applications of structural health monitoring using sensors. Data acquisition, digital signal processing, random vibration, basic control theory, modal analysis, damage detection algorithms, and decision support system. Experimental methods for structural health monitoring of civil structures.

#### **5710. Case Studies in Transportation Engineering**

Three credits. Prerequisite: department consent required. Not open for credit to students who have passed CE 4710.

Analysis of transportation case studies in transportation design, and transportation and land use planning. Application of transportation engineering and planning skills. Oral and written group reports, group discussions, individual papers.

#### **5715. Sustainable Transportation**

Three credits. Recommended preparation: CE 2710.

Assesses the role of the land-based transportation system in terms of how it affects the environmental, social and economic goals for a sustainable society. How the concept of sustainability can be used as a holistic framework for assessing the transportation and land use system. Strategies for reducing the environmental, social and economic footprint of the transportation/land use system and ways they can be implemented.

#### **5720. Street and Highway Design**

Three credits. Not open for credit to students who have passed CE 4720.

Urban street and highway design: vertical and horizontal alignment, cross-section elements, traffic barriers, interchanges and intersections, pedestrian and bike facilities, traffic calming, community and roadside elements

#### **5725. Transportation Safety**

Three credits. Prerequisite: Instructor consent. Recommended preparation: CE 2211 and 2251 or equivalent courses in engineering, economics, and statistics.

Human factors in traffic safety, economic costs of crashes, crash data collection and database management, elements of statistics and crash count distributions, exploratory analysis of crash count data, regression analysis of crash count data, before-after studies, network screening and diagnosis, roadway and roadside design, crash modification factors.

#### **5730. Transportation Planning**

Three credits. Not open for credit to students who have passed CE 4730.

Transportation economics, urban transportation planning process, local area traffic management, evaluation of transportation improvements, land use and transportation interaction.

#### **5735. Public Transportation Systems**

Three credits.

Characteristics of public transportation systems, public transport network planning, station spacing and design, public transportation and land use development, public transportation network design problems, and introduction to transit assignment.

#### **5740. Traffic Engineering Characteristics**

Three credits. Not open for credit to students who have passed CE 4740.

Relationships among traffic flow characteristics; microscopic and macroscopic representations of traffic flow; capacity of highways; traffic stream models; shock wave analysis; queueing analysis; traffic simulation.

#### **5750. Pavement Design**

Three credits. Not open for credit to students who have passed CE 4750.

Analysis and design of flexible and rigid pavements; testing and characterization of paving materials.

#### **5812. Ecohydrology**

(Also offered as ENVE 5812.) Three credits.

Focuses on the interactions between ecological processes and the water cycle, emphasizing the hydrological mechanisms underlying various terrestrial ecological patterns and the ecological properties controlling the hydrologic and climatic regimes. Topics include conceptual understanding of hydrological cycle over vegetated land, quantifying and modeling flux exchanges in the soil-vegetation-atmosphere continuum, case studies on the hydrological impact of land use land cover changes, ecosystem response to environmental changes, and vegetation-climate feedback at the regional and global scales.

#### **5820. Unsaturated Flow and Transport**

(Also offered as ENVE 5820.) Three credits.

Modern approaches to water flow and solute transport in partially-saturated porous media including media characterization (review); unsaturated flow in porous media (governing equations, hydraulic functions, numerical and analytical solution methods); solute transport in unsaturated media (convection dispersion, transfer functions, solutions); modeling and observational scales; coupled water flow and solute transport (model applications); special topics (preferential flow, effects of spatial variability, stochastic aspects of flow and transport, gas exchange and transport measurement methods).

#### **6725. Statistical and Econometric Methods for Transportation Data Analysis**

Three credits. Prerequisite: Instructor consent. Recommended preparation: completion of an introductory graduate-level statistics course or equivalent, and completion of a graduate-level transportation core course.

Application of various statistical methods for analysis of transportation data, including linear regression, count data models, logistic regression, discrete outcome models, ordered probability models, random parameter models, and duration models among others.

#### **6730. Travel Demand Forecasting**

Three credits.

Alternative formulations and calibration of trip generation, trip distribution and travel mode choice prediction models. Traffic network equilibrium and assignment.

#### **6735. Transportation Network Analysis**

Three credits. Prerequisite: CE 5730. Recommended preparation: CE 4210.

Network modeling and graph theoretical applications to transportation systems. Algorithmic approaches to common network problems. System optimal and user equilibrium traffic assignment modeling and solution techniques.

**6740. Traffic Engineering Operations**

Three credits.

Driver, pedestrian and vehicle operating characteristics. Traffic data collection. Accident and safety analysis. Highway capacity analysis. Traffic signs and markings. Traffic signal timing and operation. Traffic management.

**6830. The Flood Problem**

Three credits.

Flood hazards. Preventing or alleviating damages. Flood frequency analysis. Effect of land-use/land-cover and soil moisture on flooding. Remote sensing in flood prediction. Flood and dam-break modeling. Multiple purpose projects.

**6920. Doctoral Teaching Practicum**

(Also offered as ENVE 6920.) Variable (0-3) credits.

Offered by special arrangement. Practical experience in classroom teaching with mentoring from a member of the graduate faculty.

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**Classics and Ancient Mediterranean Studies (CAMS)**


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**5301. Special Topics in Latin Literature**

Variable (1-6) credits. May be repeated for credit.

**5302. Special Topics in Ancient Greek**

Three credits. Prerequisite: open only to Comparative Literature and Cultural Studies, Medieval Studies, and Judaic Studies graduate students; instructor consent required. May be repeated for credit with a change in topic.

Reading of Ancient Greek texts in the original language.

**5328. Advanced Latin Composition**

Three credits.

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**Clinical and Translational Research (CLTR)**


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**5000. Graduate Seminar in Clinical and Translational Research**

Three credits. Prerequisite: Department consent.

Introduction to clinical research, utilizing lecture, the textbook *Designing Clinical Research* by Hulley and Cummings, et al. (Third Edition) and practical application writing a research proposal, provides training in the methods of clinical investigation to physicians and other health professionals.

**5020. Biostatistical Methods in Clinical Research**

(Also offered as NURS 5020.) Three credits. Prerequisite: Department consent.

Quantitative procedures including descriptive and inferential statistics, non-parametric approaches to data, and parametric analyses through factorial analysis of variance.

**5022. Graduate Seminar in Clinical and Translational Research**

One credit. Prerequisite: Department consent.

Reading and discussion of methodological and statistical developments in various areas of clinical and translational research

**5099. Independent Study in Clinical and Translational Research**

Variable (1-3) credits. May be repeated for a total of six credits.

A reading course for those wishing to pursue special topics in the clinical and translational research under faculty supervision.

**5252. Cond/Translational Clinical Community-Based Research to Improve Healthcare Policies and Practices**

Three credits. Prerequisite: Instructor consent.

Learning objectives: Students taking this course will learn how to: 1. design effective investigations of healthcare practices and programs; 2. design, implement, and translate effective clinical and health-related interventions; 3. design effective evaluations of clinical and community-based practices and programs; 4. develop competitive applications for external funding.

**5357. Principles of Clinical and Translational Research I**

Three credits.

First core course in research methods, biostatistics and topics in clinical and translational research. In the methods section, the topics covered include Defining a Research Question, Cross-Sectional Studies, and Case-Control Studies. The Biostatistics section covers Probability Distributions, Sample Size Calculations, Hypothesis Testing, Odds Ratios and Logistic Regression. The major other topic is ethical issues in research, including specifically those related to the conduct of research with human beings.

**5358. Principles of Clinical and Translational Research II**

Three credits.

Second core course in research methods, biostatistics and topics in clinical and translational research. The methods section covers Observational Perspective Studies, Randomized Controlled Trials, and Information Synthesis. The biostatistics section covers Analysis of Variance, Survival Analysis, Analysis of Randomized Controlled Trials, and Methods of Meta-Analysis. The major other topics are data management and other informatics.

**5359. Principles of Clinical and Translational Research III**

Three credits.

Third core course in research methods, biostatistics and topics in clinical and translational research. The methods section includes Instrument Development, Cross Cultural Adaptation of Research Instruments, Genetic Epidemiology, Pharmacoepidemiology, Pharmacogenomics, and Secondary Data Analysis. The biostatistics section includes Handling Missing Data, Analysis of Genetic Epidemiologic Studies, Structural Equation Modeling, and Economic Analyses. The other topics include writing and presenting scientific information.

**5360. Critical Issues Involving Science Publication: The Scientific Review**

Three credits.

Provides comprehensive, systematic strategies for summarizing the current state of understanding in a given field. Each student will be required to identify and work with an academic mentor of that given field throughout the course. The purpose of

this review course may be to present a coherent argument, or to highlight scientific gaps in the literature. Teaches students to be able to identify the "why" behind a new study, find and analyze other studies that address similar research questions, or studies that address your research question on a different level. Will enable students to learn how to synthesize the current state of knowledge (either clinical or research) of the chosen topic as a first step of becoming a clinical/translational researcher.

**5407. Clinical and Translational Research Practicum**

Variable (1-12) credits. Prerequisite: Open only to Clinical and Translational Research M.S. students; department consent required. May be repeated for a maximum of 12 credits.

Provides practical training in the formulation and conduct of clinical and translational research. Specific aspects that will be covered during the 9-12 total hours of the practicum will be: the identification of a specific research question and its specification as one or more aims, review of the relevant literature, and specification of the methods to be employed in the conduct of the study, including experience in recruitment and retention of subjects, an IRB application and HIPAA documents preparation. The student will initiate a research project and participate in data collection and analysis, culminating in a report of the findings. These activities will be monitored and mentored by a research advisor who is a member of the Graduate Faculty.

**5497. Minority Health and Health Disparities**

Three credits.

Health outcomes in the U.S. vary dramatically as a function of race and ethnicity. The course will highlight research that explores this issue from social, behavioral and psychological perspectives, as well as physical environment and biological perspective. The course will discuss ideas about the meaning of race and ethnicity in American society.

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**Cognitive Science (COGS)**


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**5001. Cognitive Science Pro-seminar**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

A survey of current research in cognitive science, with presentations by cognitive science faculty.

**5120. Structure, Acquisition and Processing of Language**

Three credits. Prerequisite: Instructor consent.

Selected topics in syntax, semantics, phonology, morphology. Connections to current research in language acquisition, sentence processing, neurogenic disorders.

**5130. Neurodevelopment and Plasticity**

(Also offered as PSYC 5150.) Three credits. Prerequisite: Open only to graduate students in Psychological Sciences; Speech, Language and Hearing Sciences; and Physiology and Neurobiology.

Overview of brain development including: embryonic neurogenetics; evolution and evo-devo; how emergent behavioral capabilities reflect neural growth in neurobehavioral development; and how disruptions of neurodevelopment cause developmental disabilities. Offered alternating years in Spring semester.

**5140. Neurobiology of Language: Typical and Atypical Cognition and Language Development**

(Also offered as PSYC 5445.) Three credits. Prerequisite: Open only to graduate students in Psychological Sciences; Speech, Language and Hearing Sciences; and Physiology and Neurobiology. Recommended preparation: one of COGS 5110, 5120, 5130, 5150; LING 5110; PSYC 5440; or SLHS 5348.

Survey of current research on language acquisition in developmentally delayed/pathological populations, including but not restricted to Autism, Williams Syndrome, Down Syndrome, and Specific Language Impairment. Examination of what the language delays and deficits reveal about each disorder, the processes of language acquisition, the representation and organization of language, and the biology/neuropsychology/genetics of language.

**5150. Cognitive Neuroscience of Language Across the Lifespan**

(Also offered as PSYC 5424.) Three credits. Prerequisite: Open only to Psychological Sciences, Linguistics, and Speech, Language and Hearing Sciences graduate students.

The cognitive neuroscience approach to the study of language across the lifespan. Recent advances in neuroimaging techniques such as MRI, ERP, TMS, and fNIRS are combined with classic lesion studies to address the neurobiological bases of typical and atypical language processing.

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## Communication (COMM)

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**5001. Introduction to Graduate Communication Research**

Three credits.

An introduction to quantitative research methods and statistics. Issues of measurement and design of communication studies as well as basic descriptive and inferential statistics are covered.

**5002. Research Methods**

Three credits.

Integrative approach to modeling theory, research design, and statistical analysis, including mathematical models, scale construction, measurement issues, correlation, regression, and analysis of variance.

**5003. Advanced Communication Research Methods**

Three credits. Prerequisite: COMM 5002.

Research techniques and procedures for the study of communication. Research design, multivariate statistics, and structural modeling.

**5010. Theory Construction and Research Design**

Three credits. Prerequisite: COMM 5002.

Conceptualization, theory construction, and review of communication methodologies. Students will write a proposal for independent research, thesis, or dissertation.

**5100. Persuasion Theory and Research**

Three credits.

Evaluation of current and traditional theories of persuasion and attitude change from communication, social psychology, and related disciplines.

**5101. Motivation**

(Also offered as PSYC 5101.) Three credits.

Theories of motivation considered in relation to their supporting data.

**5120. Communication Campaigns**

Three credits.

Campaign theory and planning. Students learn how to conduct interviews and focus groups with members of a target audience, and work with non-profit organizations to design a campaign.

**5150. Crisis and Risk Communication**

Three credits. Prerequisite: Open only to Communication graduate students.

Research, theory, and best practices in crisis and risk communication.

**5200. Interpersonal Communication**

Three credits.

Cognitive, emotional and behavioral interactions in specific contexts, including interpersonal relationships, groups, and work.

**5220. Group Communication Research**

Three credits.

The group communication process with emphasis upon research methodologies for the study of interactions in a group setting.

**5230. Organizational Communication: Theory and Research**

Three credits.

Relationship of prescribed and informal communication networks to organizational goal achievement and individual integration. Emphasis on frequently used research methodologies.

**5300. Mass Communication Theory**

Three credits.

Introduction to major theories, with emphasis on the structure, function, and effects of mass media.

**5310. Seminar in Mass Communication Research**

Three credits.

Recent theories of social and political effects of mass communication, and the cognitive processing of media messages.

**5330. Children and Mass Media**

Three credits. Prerequisite: Open only to Communication graduate students; instructor consent required.

This course provides an overview of important issues, theoretical perspectives, and research regarding children's and adolescent's reactions to mass media including developmental differences in the processing of media content and in the effects of such materials.

**5500. Nonverbal Communication**

Three credits.

The study of metacommunication: Kinesics, space, time and other concomitants of verbal messages. How the non-verbal band helps in the interpretation of verbal messages.

**5501. Seminar in Nonverbal Communication and Persuasion**

Three credits.

Role of media nonverbal communication in persuasion and media preferences. Affective and analytic communications in attitude formation, structure, and change.

**5640. Social Media Use and Effects**

Three credits. Prerequisite: Open only to Communication graduate students, others with consent.

Research and theory on the social and psychological predictors and effects of social media use as well as social media platforms: their technology, functions, and analysis of collected data.

**5650. Communication Technology and Society: Theory and Research**

Three credits.

Theory and research associated with the study of emerging communication technologies. Provides a comprehensive foundation in the scholarly literature addressing the content, adoption, uses and effects of new media.

**5660. Computer Mediated Communication**

Three credits.

Communication networks, human-computer interaction and interface design, social and collaborative communication via computer.

**5770. Health Communication**

Three credits.

Overview of health communication, including health behavior change interventions, emergency communication, risk assessment, media influences, provider-patient communication, socialization and identity, stereotyping, social support, diverse populations, and new communication technologies.

**5892. Practicum in Research**

Variable (1-6) credits. May be repeated for a total of 18 credits.

May be repeated for credit.

**5895. Variable Topics in Communication**

Variable (1-3 credits). Prerequisite: Instructor consent. May be repeated for credit.

Instructor consent required. May be repeated for credit with a change in topic.

**5899. Independent Study in Communication**

Variable (1-6) credits. May be repeated for credit.

This course is an independent study course in which periodic conferences with the instructor are required.

**5900. Professional Communication**

Three credits. Prerequisite: Open to graduate students.

Theories and applications of communication in professional settings. Focus on effective design of relevant messages to reach various audiences. Preparation for future employment by cultivating high-caliber communication skills through lecture content and workshops.

**5991. Internship in Communication**

Variable (1-3) credits. Prerequisite: Open to graduate students in Communication. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Students complete a departmentally approved internship within one semester.

**6001. Proseminar in Communication Research**

Three credits. Prerequisite: COMM 5002, 5003, and 5010.

Advanced topics in communication research presented by faculty and specialists. Topics include information theory, survey of sampling and data

collection, time series analysis (time-domain and panel design), physiological measurement, interaction analysis, and meta-analysis.

#### **6800. Seminar and Directed Research in Communication**

Variable (1-6) credits. Prerequisite: Open to graduate students in the Marketing Communication Program. May be repeated for a maximum of 12 credits.

#### **6850. Seminar in Marketing Communication Research**

Three credits.

Theories of emotional and cognitive processing of communications; cognitive mapping and message construction; design, implementation and evaluation of information campaigns.

#### **6895. Topics in Applied Communication Research**

Three credits.

Investigation of special research techniques and findings in selected areas of applied communication research.

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### **Community Organization (CORG)**

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#### **5300. Advanced Macro Practice**

Three credits. Prerequisite: BASC 5390 and 5391, or Advanced Standing; open to students in the Community Organization concentration. Corequisites: CORG 5301, FED 5302 and 5352; or CORG 5340 for Advanced Standing students.

Contemporary and historical overview of how the macro practice methods independently and collectively can be leveraged for social change. Provides a foundation for addressing ethical obligations and challenges in macro practice, with particular focus on historically oppressed populations. In addition, students will gain an understanding of the role of leadership and use of power in community organizations and policy and practice.

#### **5301. Essential Theory and Intervention Practice in Community Organization**

Three credits. Prerequisite: BASC 5390 and 5391, FED 5351 and 5301; open only to M.S.W. students in the Community Organization concentration. Corequisite: FED 5352.

Builds on content covered in micro and macro foundations of social work practice and reviews in greater depth community organization history, values and assumptions, Rothman models of organizing, roles of the community social worker, and strategies used by community organizers to bring about change. Promotes in-depth understanding of the various types of communities and enhances skills for community analysis. Essential information for grassroots organizing and community and coalition building is covered. Incorporates content on providing community based services to oppressed population groups, including leadership development and advocacy. Highlights the importance of power theory and dynamics in selecting models and strategies for intervention. The importance of relationship building and attention to process tasks and goal achievement are covered. Required for students in the Community Organization concentration.

#### **5302. Theory and Practice of Social Movements for Community Organizers**

Three credits. Prerequisite: CORG 5354 and FED 5311 must be taken concurrently; open only to M.S.W. students in the Community Organization concentration.

Integrates Community Organization foundation and advanced method practice knowledge, values and skills. Students will be asked to select an agency-based Community Organization assignment that they have been working on during the academic year as the basis for a capstone assignment. Appropriate literature that will help students in conceptualizing and writing their capstone assignments will also be distributed and discussed. Concentration on addressing social movement theory and implications for social change and community social work. A minimum of two social movements will be analyzed and one or more social movement related projects will be selected as an in-class project(s). Required for students in the Community Organization concentration.

#### **5340. Advanced Macro Practice Skills Laboratory**

One credit.

Focuses on gaining knowledge and skills in the elements of program planning and proposal writing, and includes application of these through development of a program proposal for funding. The skills laboratory will provide an additional opportunity for students to apply knowledge and skills through a proposal review and evaluation exercise. The exercise will be conducted on the last day of the course after the final projects have been submitted. The instructor will choose one final project for the purposes of the review exercise with the students name removed. Note: more than one proposal can be selected offering an opportunity for ranking them in the exercise.

#### **5353. Field Education in Community Organization III**

Four credits. Prerequisite: Open only to M.S.W. students in the Community Organization concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required for students in the Community Organization concentration.

#### **5354. Field Education in Community Organization IV**

Four credits. Prerequisite: Open only to M.S.W. students in the Community Organization concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required for students in the Community Organization concentration.

#### **5355. Block Placement in Community Organization**

Eight credits. Prerequisite: FED 5352 and FED 5302; open only to M.S.W. students in the Community Organization concentration. Corequisite: POPR 5310 and FED 5350. Instructor consent required. Students taking this course will

be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Field Education in Community Organization for well-prepared students who have completed all course requirements except the second year of field education and the appropriate method course. Required for students in the M.S.W. program completing a Block Field Placement.

#### **5370. Grassroots Neighborhood Organizing**

Three credits. Prerequisite: FED 5352 or Advanced Standing; open only to M.S.W. students in the Community Organization concentration. Corequisite: CORG 5353 and FED 5310, or CORG 5355.

Provides intensive instruction for students who wish to become practitioners or trainers in grassroots neighborhood model of organizing. Examines Alinsky's model of organizing and the refinement of that model. Elective course for Substantive Area: Focused Area of Study on Urban Issues in Social Work.

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### **Comparative Literary and Cultural Studies (CLCS)**

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#### **5301. Variable Topics**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Possible topics include literature and the other arts, the sociology of literature, literature and psychology, and themes. May be repeated for up to nine credits with a change of topic.

#### **5302. Introduction to Literary Theory**

Three credits. Prerequisite: Instructor consent.

Historical survey of theoretical paradigms or schools of literary theory. Topics may include literary representation, the relationship between literature and society, interpretation and meaning, ideology. Emphasis on the aims of theory, its object, and its status vis à vis other disciplines of the human sciences.

#### **5304. Studies in Literary History**

Three credits. Prerequisite: Instructor consent.

Periods, movements, and literary relations involving several national literatures. Possible topics include the Baroque, the Enlightenment, Symbolism, and the Avant-Garde.

#### **5305. Comparative Studies in Romanticism**

Three credits.

West European Romanticism, the Bildungsroman, the quest, stories of the fantastic, and the greater Romantic lyric. Includes works of Goethe, Coleridge, Poe, Hugo and Leopardi.

#### **5306. Studies in Form and Genre**

Three credits.

Aspects of epic, drama, poetry, or narrative, such as the classical epic, the historical drama, the pastoral poem, or the picaresque novel.

#### **5308. Marxist Literary Criticism**

Three credits.

Introduction and survey of Marxist texts from Marx and Engels to Gramsci, Lukacs, Frankfurt School theoreticians, and contemporary theorists, feminists, and third-world practitioners.

#### **5310. Psychoanalysis and Literature**

Three credits.

Introduction to the literary and cultural application of psychoanalytic theory to the reading of literary texts; psychoanalytic interpretation from Freud to Lacan and feminist Lacanians.

### 5311. Introduction to Semiotics

Three credits. Prerequisite: Instructor consent.

Historical development and fundamentals of semiotics. Classical and structural models. Varying emphasis on a particular theory and its development.

### 5313. Theory and Practice of Translation

Three credits.

### 5317. Studies in Comparative Culture

Three credits. Prerequisite: Instructor consent.

The intersection of ideas concerning urbanization and modernism through the medium of literature, architecture, fine arts, and film.

### 5318. Special Studies

Variable (1-6) credits. May be repeated for a total of nine credits.

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## Computer Science and Engineering (CSE)

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### 5095. Special Topics in Computer Science and Engineering

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. May be repeated for credit.

Classroom courses in special topics as announced in advance for each semester.

### 5097. Seminar

One credit. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. May be repeated for a maximum of eight credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Presentation and discussion of advanced computer science problems.

### 5099. Independent Study in Computer Science and Engineering

Variable (1-6) credits. Prerequisite: Open only to Computer Science and Engineering graduate students; instructor consent required. May be repeated for credit.

Individual exploration of special topics as arranged by the student with an instructor.

### 5102. Advanced Programming Languages

Three credits. Prerequisite: Open to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 4102 and 3502 or the equivalent.

The theory and pragmatics of modern programming languages. Topics include syntax, semantics, type systems and control mechanisms. Key contributions from Functional and Logic Programming including first-order functions, closures, continuations, non-determinism and unification are studied. Study of declarative and operational semantics of recent entries in the field like Constraint Programming and Aspect Oriented Programming.

### 5103. Performance Engineering

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others

with consent. Recommended preparation: CSE 3504 and CSE 4500.

Study of performance engineering techniques for the development of software systems to meet performance objectives. Software performance principles, hierarchical performance modeling, and current research trends related to Software Performance Engineering. Methods for computer performance evaluation and analysis with emphasis on direct measurement and analytic modeling, including queuing networks, computation structure models, state charts, probabilistic languages, and Petri-nets. Case studies for the evaluation and analysis of software architecture and design alternatives.

### 5105. Software Reliability Engineering

Three credits. Prerequisite: Open to Computer Science and Engineering graduate students, others with consent. Recommended Preparation: CSE 2102 and 3504 or equivalent.

State-of-the-art as well as emerging reliability assessment techniques. Topics covered will include reliability modeling paradigms, software reliability growth models, software metrics and reliability, software testing and reliability, and architecture-based reliability assessment. Hands-on experience in the application of these techniques.

### 5300. Advanced Computer Networks

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 3300 or equivalent. Not open for credit to students who have passed ECE 6431.

Advanced fundamental principles of computer networks. Topics include network design and optimization, protocol design and implementation, network algorithms, advanced network architectures, network simulation, performance evaluation, and network measurement.

### 5302. Computer Architecture

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 4302 or the equivalent.

Provides an in-depth understanding of the inner workings of modern digital computer systems. Traditional topics on uniprocessor systems such as performance analysis, instruction set architecture, hardware/software pipelining, memory hierarchy design and input-output systems will be discussed. Modern features of parallel computer systems such as memory consistency models, cache coherence protocols, and latency reducing/hiding techniques will also be addressed. Some experimental and commercially available parallel systems will be presented as case studies.

### 5304. High-Performance Parallel Computing

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 4302 and 4500.

Topics in high-performance computing such as the following (1) Parallel Algorithms and Parallel Computation: including programming models (Circuits and PRAMs), complexity analysis, modern parallel platforms and programming libraries; (2) Shared- and Distributed-Memory Parallel Architectures: including cache coherence, Memory consistency, processor synchronization,

latency tolerance and hiding; (3) Interconnection Networks: including quantitative measures, topologies, switch architectures, routing strategies; as well as (4) Contemporary and Future HPC Systems.

### 5306. Advanced Operating Systems

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 4300 or equivalent.

Topics in modern operating systems with the focus on distributed computing, communication, and concurrency. Selected topics from current research in the theory, design, implementation, and verification of operating systems.

### 5309. Networked Embedded Systems

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 2300W, 3300, and 3666.

Introduction to the design, analysis and implementation of networked embedded systems that interact with the physical environment. Applications of such systems include environmental monitoring, consumer electronics, medical devices, automotive systems, industrial process control, distributed robotics, and smart structures. Topics covered include concepts, technologies and protocols for low-power and resource-restricted wireless networks; models of computation and physical systems; embedded system architectures; and real-time system concepts, theory and design principles.

### 5500. Algorithms

Three credits. Prerequisite: Open to Computer Science and Engineering graduate students. Recommended preparation: CSE 3500 or equivalent.

Introduction to the design and analysis of algorithms. The course will discuss fundamental design techniques and related issues such as amortized analysis, linear programming, network flow, NP-Completeness, approximation algorithms, randomized algorithms, advanced data structures, and parallel algorithms.

### 5506. Computational Complexity

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 3500 and 3502; MATH 3160 or equivalent.

Systematic study of resource-bounded computation, including time and space complexity, hierarchy theorems, nondeterministic and randomized computation, and reduction and completeness. Advanced topics may be introduced such as relativized computation, derandomization, communication complexity, lower bounds on circuit complexity, and probabilistically checkable proofs.

### 5510. Distributed Computing and Fault Tolerance

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students; instructor consent required. Recommended preparation: CSE 4300 and/or 4500.

Topics in the design and analysis of robust distributed algorithms that combine efficiency and fault tolerance. Models of distributed computation and failures. Inherent limitation in achieving fault

tolerance in distributed systems. Basic problems considered include communication services, robust cooperation, agreement, consistent distributed memory.

#### **5512. Introduction to Quantum Computing**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students; instructor consent required. Recommended preparation: CSE 3500, 3502, and MATH 2420Q.

Introduction to quantum computing, quantum algorithms, and quantum information theory. Quantum mechanics including elementary aspects of its mathematical formalism; quantum circuit model and quantum complexity theory; development and analysis of several fundamental quantum algorithms, focusing on Grover's algorithm for database search and Shor's number-theoretic algorithms. Second half covers the density matrix formalism of quantum mechanics, von Neumann entropy, quantum channels, and quantum error-correction. If time permits, some implementations of quantum computers and current progress will be discussed.

#### **5514. Computational Geometry**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: MATH 2110Q and 2210Q or equivalent.

Algorithms and data structures for constructing geometric objects, computing geometric properties, and answering geometric queries as well as techniques for the analysis of their correctness and complexity.

#### **5600. Computer Science and Engineering Research Laboratory**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. May be repeated for credit with a change in content.

Experimental investigation of current research topics in computer science.

#### **5707. Discrete Optimization**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 3500 and MATH 2210.

Methods and techniques used to solve combinatorial optimization problems with examples drawn from industry such as scheduling, resource allocation, and routing. Features a mix of theory and practice using state-of-the-art tools to solve classic problems.

#### **5713. Data Mining**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent.

Introduction to data mining algorithms and their analysis. Application of and experimentation with data mining algorithms on real-world problems and domains, with a dual focus on addressing the solution quality issue and the time efficiency issue.

#### **5717. Big Data Analytics**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 3500 and MATH 2210.

Focuses on data science and big data analytics. Introduces basic concepts of data science and

analytics. Different algorithmic techniques employed to process data will be discussed. Specific topics include: Parallel and out-of-core algorithms and data structures, Rules mining, Clustering algorithms, Text mining, String algorithms, Data reduction techniques, and Learning algorithms. Applications such as motif search, k-locus association, k-mer counting, error correction, sequence assembly, genotype-phenotype correlations, etc. will be investigated.

#### **5800. Bioinformatics**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent.

Advanced mathematical models and computational techniques in bioinformatics. Topics covered include genome mapping and sequencing, sequence alignment, database search, gene prediction, genome rearrangements, phylogenetic trees, and computational proteomics.

#### **5810. Introduction to Biomedical Informatics**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students; instructor consent required. Recommended preparation: CSE 4102, 4701 or 4300.

Introduction to biomedical informatics theory and practice with an emphasis on data management for information classification (ontologies), collection, storage, analysis, dissemination, etc., applied to medical, clinical, and public health domains. Topics include: software architectures, security and privacy, interoperability and data exchange, standards and the semantic web, health care systems, clinical decision support, data mining, health care systems, monitoring and sensor devices, and cloud/grid computing.

#### **5815. Systems Biology: Constructing Biological Knowledgebase**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent.

Design and architecture of biological knowledge base. Topics covered include biological/biomedical data modeling, knowledge representation techniques of biological and biomedical information, review of existing inference methods, methods of assessing evidence quality, design of inference-enabling genomics annotation system, various meta-data analysis methods involving genomics and biomedical data.

#### **5820. Machine Learning**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 3500; MATH 2110, 2210, and 3160 or equivalent.

Enables students to understand and use machine learning methods across a wide range of settings. Mixture of theory, algorithms, and hands-on projects with real data. Besides traditional machine learning topics, e.g., supervised learning, unsupervised learning and semi-supervised learning, introduces advanced topics such as dimension reduction; structured data learning; kernel learning; imprecisely supervised learning; longitudinal data analysis; causal inference, etc.

#### **5840. String Algorithms and Applications in Bioinformatics**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students; instructor consent required.

Classic string matching algorithms (e.g. Knuth-Morris-Pratt, Karp-Rabin, suffix tree and arrays) and more advanced string algorithms (e.g. Burrows-Wheeler transform). With a particular focus on rigorous treatment of string processing algorithms and their analysis. Applications of string algorithms to bioinformatics problems. Students are expected to have basic prior knowledge of algorithm design and analysis.

#### **5850. Information and Data Security**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: CSE 4701 and 4300 or equivalent.

Introduction to computer security and the design of secure systems. Security and threat modeling. Entity authentication and privacy, data integrity and confidentiality. Crypto-graphic tools: symmetric and asymmetric encryption, digital signatures, message authentication codes, hash functions. Security at the operating system level, access control, security enforcement, memory protection. Network security, firewalls, internet worms and viruses, intrusion detection. Digital rights management, software security, program obfuscation, implementation flaws, buffer overflow attacks. Case studies in topical areas.

#### **5852. Modern Cryptography: Foundations**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others with consent. Recommended preparation: MATH 3160, CSE 3500, and 3502 or equivalent.

The foundations of modern cryptography introducing basic topics such as one-way functions, pseudorandom generators, and computational hardness assumptions based on number theory. Fundamental cryptographic constructions such as hard-core predicates, secure symmetric encryption and message-authentication codes, and public-key cryptography.

#### **5854. Modern Cryptography: Primitives and Protocols**

Three credits. Prerequisite: Open only to Computer Science and Engineering graduate students, others by consent. Recommended preparation: MATH 3160; CSE 3500, 3502, and 4702 or equivalent.

Modern cryptography, emphasizing provable security and concrete constructions based on the hardness of specific computational problems. After surveying some basic cryptographic primitives and associated number-theoretic constructions, focuses on public-key infrastructure and protocols: it will cover such topics as digital signatures, identification and key-exchange schemes, distributed key generation, blind signatures, zero-knowledge proofs, and private function computation.

#### **5860. Computational Problems in Evolutionary Genomics**

Three credits. Prerequisite: CSE 5800; open only to Computer Science and Engineering graduate students, others by consent.

Computational and algorithmic approaches for problems arising in evolutionary genomics. Topics may include phylogenetic trees inference,

population evolutionary models and theory, understanding complex evolutionary processes and other related topics. Both combinatorial optimization and stochastic approaches will be covered.

#### **6300. Research Topics in Computer Networks**

Three credits. Prerequisite: CSE 5300; open only to Computer Science and Engineering graduate students, others with consent.

Current research issues in the Internet, wireless and mobile networks, as well as emerging concepts such as sensor networks. Overview of the fundamental design principles underlying these networks. Discussion and exploration of the advanced research topics in these and other areas.

#### **6512. Randomization in Computing**

Three credits. Prerequisite: CSE 5500; open only to Computer Science and Engineering graduate students; instructor consent required.

Introduction to the theory and practice of randomization and randomized algorithms as a technique for science and engineering problem solving. Topics covered include: probability theory, types of randomization, sorting and selection, hashing and skip list, finger-printing, packet routing, geometry and linear programming, graph algorithms, combinatorial optimization, and external memory algorithms.

#### **6514. Computational Topology**

Three credits. Prerequisite: MATH 5310 and 5311; open only to Computer Science and Engineering graduate students, others with consent.

Topology has traditionally generalized concepts of real analysis to metric spaces and set axioms. The new field of computational topology has great potential for encompassing abstractions to unify domain-specific techniques now used in computational geometry, geometric modeling, visualization, image processing, engineering analyses and molecular simulation. Includes perspectives from traditional topology and show how these need to be modified for realistic use in modern computing environments. Topics and emphases will vary.

#### **6800. Computational Genomics**

Three credits. Prerequisite: CSE 5800 or BME 5800; open only to Computer Science and Engineering graduate students; instructor consent required.

Advanced computational methods for genomic data analysis. Topics covered include motif finding, gene expression analysis, regulatory network inference, comparative genomics, genomic sequence variation and linkage analysis.

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## **Dental Science (DENT)**

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#### **5430. Advanced Oral Histology**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Oral tissues, their embryological origin, histology and function. Structure of developing teeth, alveolar bone, temporo-mandibular joint, oral mucosa, gingiva and salivary glands. Lecture, slide review, and student-led discussions of papers from the research literature.

#### **5431. Advanced Oral Pathology and Diagnosis**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Seminars on current developments in oral disease processes, with an emphasis on the clinical. Student presentations and lectures covering principles of Oral Diagnosis.

#### **5432. Biomaterials for Dental Graduates**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Literature review/seminar covering various subjects of current interest in dental materials. Some prior knowledge of dental materials or of materials science is assumed.

#### **5434. Functional Oral Anatomy**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Anatomic structures and relationships of the head and neck emphasizing surgical anatomy for oral, periodontal and endodontic surgery. Lectures and dissections.

#### **5435. General Pathology**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

#### **5437. Principles of Oral Microbiology and Infections**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Oral flora with emphasis on recent research developments. Ecology of the oral cavity, dental caries and periodontal disease, viral and yeast infections. Prior knowledge of microbiology and biochemistry assumed. Lectures and discussions, term paper required

#### **5438. Craniofacial Growth and Development**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Part of a core series in the postgraduate program of orthodontics. Provides systematic coverage of basics in growth and development of the human face. Review and critique of selected articles from the research literature of the following areas: Physiology of facial growth, theories in growth mechanisms, pre- and postnatal growth of the face, normal and abnormal courses of the facial growth.

#### **5439. Research Methods in Epidemiology and Behavioral Sciences**

One credit. Prerequisite: DENT 5456 or equivalent; only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Provides students with an applied understanding of behavioral science research methods, building off of concepts introduced in DENT 5456. Featured topics include: theoretical and methodological issues in research design; data collection strategies, focusing on survey measurement and the design and evaluation of survey questions; population sampling; data entry and variable construction; strategies for analyzing quantitative data, focusing in particular on regression analysis with

dichotomous outcomes; and issues in analyzing longitudinal data.

#### **5440. Biodontics: Integrating Biotechnology with Clinical Dentistry**

Three credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

The goal of the Biodontics educational program is to explore the process of introduction of biotechnology-based innovations into clinical dentistry. The course will focus on a variety of innovations, including those considered "disruptive," and explore the laboratory and clinical studies underlying their translation from the bench to chairside. The course will also consider the process of "diffusion" of innovations into dental practice and examine the barriers to acceptance by dental office personnel. Students, working in teams, will be required to present a business plan for the development and marketing of a new dental product.

#### **5441. Biomechanics in Dental Science**

Four credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Physics and engineering principles applied to clinical and research problems in dentistry. Principles of statics and mechanics of materials. Engineering analysis of orthodontic appliances. Lectures, seminars, and demonstrations.

#### **5442. Biomechanics in Dental Science**

One credit. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

History and critical review of orthodontic appliance systems. The relationship between treatment planning and therapy is explored. Detailed biomechanical analysis of appliance therapy. Lectures, seminars and demonstrations.

#### **5443. Biology of Tooth Movement**

One credit. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Hard and soft tissue responses to tooth movement caused by orthodontic appliances; theory of related bone resorption and apposition from a morphological and biochemical standpoint. Seminars.

#### **5444. Epidemiology of Oral Diseases: Interpreting the Literature**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Provides a basic understanding of epidemiologic principles to enable the critical review of the literature and to provide a methodological framework with which to better understand basic statistics. An overview of the specific epidemiology of oral diseases will be provided.

#### **5455. Scientific Writing**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

The basics of effective scientific writing in a six-week combined lecture and workshop format. Lectures cover scientific style, clarity in writing, development of hypothesis and organization of abstracts and manuscripts. Guest

lectures and workshops provide specific direction in summarizing clinical, laboratory or social/biobehavioral research studies. Students are required to write and revise an extended abstract of their research and to present their abstract in small groups on the final class day.

#### **5456. Biostatistics**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Introduction to biostatistics and overview of key concepts, including data measurement and summarization, probability, populations and samples, drawing inferences, and specific statistical analyses for testing differences in means and proportions, correlation, regression, multivariate analysis, and survival analysis. Special attention is placed upon understanding how to evaluate the appropriateness of and best interpret specific statistical tests and measures. An introduction to study design and the critical review of the literature is provided with emphasis on interpretation of presented statistics.

#### **5457. Evidence Based Dentistry: Critical Reading of System Reviews, Meta-Analyses and Expert Panel Reports**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Provides dental residents with the information necessary to (1) de-mystify the methods typically used under the heading of evidence based dentistry and (2) to be able to critically assess those methods, so as to best be empowered to integrate evidence based information into their day to day practices.

#### **5495. Independent Study**

Variable (1-6) credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program. May be repeated for a maximum of 24 credits.

A reading course for those wishing to pursue special topics in dental science under faculty supervision.

#### **5500. Oral and Maxillofacial Diagnostic Imaging and Interpretation Part A**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

The first part of a three-part seminar course examining the interpretation of images produced by various techniques used in the diagnosis of diseases involving the oral maxillofacial complex. Part A emphasizes anatomy seen on intraoral, extraoral and volumetric image acquisition, image appearances of the common dental diseases - caries, marginal periodontitis and apical periodontitis and the pathophysiologic changes that lead to their image appearances.

#### **5501. Oral and Maxillofacial Diagnostic Imaging and Interpretation Part B**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

The second part of a three-part seminar course examining the interpretation of images produced by various techniques used in the diagnosis of diseases involving the oral maxillofacial complex. Part B addresses lesions of bone and soft tissues of the

maxillofacial complex, including cysts, neoplasms and lesions that have similar appearances.

#### **5502. Oral and Maxillofacial Diagnostic Imaging and Interpretation Part C**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

The third and final part of a three-part seminar course examining the interpretation of images produced by various techniques used in the diagnosis of diseases involving the oral maxillofacial complex. Part C addresses the appearances on dentomaxillofacial imaging of genetic and acquired abnormalities, systemic diseases, temporomandibular joint disorders, salivary gland disorders and dentomaxillofacial trauma.

#### **5503. Perio-Pathobiology I Part A**

One credit. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Allows residents in Periodontology to develop an in-depth knowledge of the periodontal literature as it relates to research and clinical practice. Includes both clinical and basic science covering essential etiology concepts. Taught in a seminar format with all graduate faculty members participating as discussion leaders. Residents are assigned a group of related articles that should be read and reviewed each week prior to discussion at the scheduled seminar.

#### **5504. Perio-Pathobiology I Part B**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Allows residents in Periodontology to develop an in-depth knowledge of the periodontal literature as it relates to research and clinical practice. Includes both clinical and basic science covering essential etiology concepts. Taught in a seminar format with all graduate faculty members participating as discussion leaders. Residents are assigned a group of related articles that should be read and reviewed each week prior to discussion at the scheduled seminar.

#### **5505. Perio-Pathobiology II Part A**

One credit. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Allows Periodontology residents to develop an in-depth knowledge of the periodontal literature as it relates to research and clinical practice. Gives evidential support to all clinical procedures performed. Taught in a seminar format with all graduate faculty members participating as discussion leaders. Graduate faculty will present and discuss topics in their areas of expertise. Residents will be assigned articles related to the topic of discussion that need to be reviewed each week prior to the scheduled seminar. The assigned literature will be reviewed from a historical perspective with recent updates included as necessary (a separate current literature review will run concurrently). Allow residents to not only develop critical reading and thinking abilities but also aid in developing verbal communication skills and confidence.

#### **5506. Perio-Pathobiology II Part B**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

A continuation of Part A. Allows Periodontology residents to develop an in-depth knowledge of the periodontal literature as it relates to research and clinical practice. Gives evidential support to all clinical procedures performed. Taught in a seminar format with all graduate faculty members participating as discussion leaders. Graduate faculty will present and discuss topics in their areas of expertise. Residents will be assigned articles related to the topic of discussion that need to be reviewed each week prior to the scheduled seminar. The assigned literature will be reviewed from a historical perspective with recent updates included as necessary (a separate current literature review will run concurrently). Allows residents to not only develop critical reading and thinking abilities but also aid in developing verbal communication skills and confidence.

#### **6000. Full Time Residency**

Zero credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Full time residency for dental master's students only.

#### **6461. Clinical Radiation Sciences: Physics and Biology I**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

A continuous pair of semester lecture/seminar courses which examines the physical and biological principles underlying the uses of radiation and allied radiation sciences in clinical diagnosis and therapy. Characteristics of imaging systems, Nuclear Medicine, Radiation Therapy, biological effects of ionizing radiation, radiation measurement and dosimetry and quality assurance will be covered through critical readings in texts and the literature.

#### **6462. Clinical Radiation Sciences: Physics and Biology II**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

A continuous pair of semester lecture/seminar courses which examines the physical and biological principles underlying the uses of radiation and allied radiation sciences in clinical diagnosis and therapy. Characteristics of imaging systems, Nuclear Medicine, Radiation Therapy, biological effects of ionizing radiation, radiation measurement and dosimetry and quality assurance will be covered through critical readings in texts and the literature.

#### **6463. Radiation Physics, Safety and Biology in Oral and Maxillofacial Diagnostic Imaging**

Two credits. Prerequisite: Only open to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

A lecture, seminar and discussion-based course examining the fundamentals of the physics involving the most commonly used diagnostic imaging modalities in oral and maxillofacial radiology. The first part of the course deals with the physics of plain film radiography, panoramic

radiography, CT, CBCT, MRI. Fundamentals of digital imaging will also be discussed. The last part of the course deals with radiation safety. Radiation safety measures and guidelines for practicing safe radiation techniques that will minimize the risk for patients and the operators during image acquisition will be discussed.

## Digital Media and Design (DMD)

### 5000. Creative Digital Fundamentals

Three credits. Online course. Prerequisite: Open to graduate students in the Digital Media and Design online graduate certificate program or non-degree graduate students; not open to full-time Digital Media and Design graduate students; instructor consent required.

Introduces core concepts for developing skills to create and implement digital graphics utilizing a combination of techniques and effects working with the applications: Photoshop, PowerPoint, After Effects and Premiere. Acquisition of these skills will prepare students to create their own animated promotional videos, edit raw video, manipulate graphic elements for posting to websites, the production of infographics and for insertion of digital elements into PowerPoint presentations.

### 5010. Digital Culture

Three credits. Prerequisite: Instructor consent.

Development and use of digital media and technology in different social and cultural contexts. Digital technology is treated as a cultural construct, the characteristics and impact of which are analyzed through social science theories of the interplay between technology and society. Ethnographies of digital media used in different parts of the world and in different digital environments will be used to examine issues such as culture, identity and social networks. Examination of different ethnographic research methods for digital anthropology.

### 5020. Design Thinking

Three credits. Prerequisite: Instructor consent.

Exploration of the nature of design thinking about how a process that employs immersion, empathy, ideation, definition, prototyping and testing can lead to innovative discovery. We will explore the ways in which diversity of culture, experience and thought lead to innovation while examining the value of a human based design process on the growth and direction of culture and society at large and how can we as designers participate in driving that process.

### 5021. Design Lab

Three credits. Prerequisite: Open only to Digital Media and Design graduate students; instructor consent required.

The theory, principles and practices of digital screen-based visual communication. Through a multi-disciplinary perspective involving art, design, art history, and media studies, students will address how culture visualizes screen-based communication through both image and type.

### 5025. Portfolio and Professional Development - Putting It All Together

Two credits. Prerequisite: Instructor consent.

Preparation for the transition to work by developing a professional grade portfolio, website, social media presence and communications

collateral and skills. Intended for advanced students.

### 5030. Narrative Workshop

Three credits. Prerequisite: Instructor consent.

Designed for students to “workshop” their own narratives and works-in-progress for animation, short/long films, commercial media, interactive media, game creation, graphic novels, and short or long form pieces of writing (novels, children’s books, short stories, etc.). Open forum/roundtable where students can bring pieces of writing or media into the class and share with other students, using each other as editors, collaborators, ideators while incorporating guest artists, writers, scientists and media makers to visit, help critique and weigh in on how their work and process has evolved given the cultural shift from printed page to e-readers, apps and the invention of viral marketing or internet video shorts, for example.

### 5035. Interaction Design

Three credits. Prerequisite: DMD 5070; open only to Digital Media and Design graduate students; instructor consent required.

Provides a critical overview of interaction design (including usability, evaluation, and cultural aspects) and a practical program of website and computer software interface creation.

### 5040. UConn Student Agency

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Exposes students to and builds an understanding of the principles necessary to communicate the essence of a commercial brand through the ideation and creation of digital and social media structures and artifacts. Based on the principles of experiential learning promoting effective ideation, development, production, and implementation of digital and social media marketing strategies and artifacts.

### 5070. Introduction to Web Design

Three credits. Prerequisite: Instructor consent.

Survey of the concepts and methodologies of Web design. Introduction to the key concepts of Web design and development as well as the software that facilitates it. No prior experience in Web design is necessary, but students must be willing to embrace a new perspective on the design process as it pertains to the creation of functioning, interactive sites. Both technically and conceptually demanding. Will require, in addition to design time, many hours of self-initiated software exploration. Comprised of a series of exercises and projects beginning with basic HTML and increasing in complexity to include multiple pages sites using CSS and simple scripting.

### 5075. MFA Final Project

Three credits. Prerequisite: Instructor consent. To be taken twice in two consecutive semesters in the student’s final year. To fulfill the graduation requirement for M.F.A., students must pass with a grade of C or better. May be repeated for a total of six credits.

Development of a project in the student’s area of concentration that demonstrates vigorous and consistent thematic engagement and articulates both technical and conceptual sophistication.

### 5086. MFA Thesis in Digital Humanities

Three credits. Prerequisite: Instructor consent.

Preparation and presentation of a thesis that demonstrates vigorous and consistent intellectual engagement and articulates technical, conceptual, and scholarly sophistication. To be taken twice in two consecutive semesters in the student’s final year.

### 5095. Special Topics

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits with a change of content.

### 5099. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 15 credits.

Independent study in a Digital Media area of concentration.

### 5200. Introduction to Motion Graphics

Three credits. Prerequisite: Instructor consent.

Provides to digital filmmakers instruction and guidance in the technique and critical understanding of motion effects, animation, and compositing. The technical instruction will be focused around the use of Adobe After Effects CS in the handling of both animated still and motion imagery. Students will create visual effects and animated graphics for television, film, web, and other types of multimedia productions using software including Adobe After Effects, Final Cut, Photoshop. The course will involve weekly technical exercise projects, practicing techniques covered in class, as well as a self-proposed midterm and final project.

### 5201. Advanced Motion Graphics

Three credits. Prerequisite: DMD 5200 and instructor consent.

Allows digital animators and filmmakers to fully develop advanced skills and large scale/longer format projects, drawing from a combination of techniques including: green screen, 2D particle systems, mattes, rotoscoping, sound sync, 2D character set up and animation, hand-drawn/frame-by-frame, 3D integration, digital cut-out animation, and/or live-action compositing. Relies primarily on After Effects, particularly exploring its 2D/3D/effects capabilities; Maya; Photoshop; Final Cut; Toon Boom and other programs may also be utilized as necessary. Draws upon a canon of films to observe successful techniques that can be applied in computer work, and also to develop sensitivity to the artistry of moving images, cinema and storytelling.

### 5205. History of Animation

Three credits. Prerequisite: Instructor consent.

Survey of animation. From the early magic lantern shows of the late nineteenth century to current and emerging digital animation technologies. Series of discussions, lectures, assignments, as well as viewing and evaluating animated work. Exploration of this subject from various perspectives: by chronology, from its prehistory before the invention of film to the present day; by form, including method and medium; by culture, comparing the US to Japan, Russia, Europe and others; by subject; and by personality, concentrating on the figures who have shaped the art form and continue to influence it through their example. Students are expected to bring an enthusiastic interest in the medium, and to devote serious effort to reading about, viewing, researching and discussing animation and the artists who have created it.

**5210. Moving Image and Sequence (Editing)**

Three credits. Prerequisite: Instructor consent.

The ability to create a high-quality audiovisual experience that has the potential to reach millions of people is critical to your success and is more possible now than ever before. Video Editing with Final Cut Pro/Adobe Premiere teaches all the steps and tools necessary to create and deliver compelling music video, montages, trailers, and much more- including how to assemble, enhance, and maximize the use of video, audio, and graphic content. Geared toward media makers who would like to create and produce their own videos, instructional videos, or anyone wanting to create and assemble video content and share it online.

**5211. Experimental and Alternative Techniques**

Three credits. Prerequisite: DMD 5200 and instructor consent.

Explores non-traditional techniques/mediums for creating motion graphics and animation. Some common forms of experimental techniques include: stop motion (photographing physical models), pixilation (stop motion with people), collage, direct-to-film, filming with/out a lens, tilt-shift, mixed media compositing, the exquisite corpse, digital cell animation, among others.

**5220. Broadcast Graphics and Title Sequence**

Three credits. Prerequisite: Instructor consent.

Survey of broadcast design and title sequences made for film, games and television. Students will develop a deep understanding of the evolution of broadcast television and film graphics, as well as a command of several methods of producing graphics.

**5230. Cinematic Storytelling**

Three credits. Prerequisite: DMD 5200 and instructor consent.

A survey of film and media, in particular, the close analysis of graphic storytelling techniques in television, animation, shorts, and movies. Alternates between explanation of specific filmmaking techniques (such as continuity editing) and discussion of the ways in which media implicitly reflect and subtly influence cultural attitudes and values. Requires a research paper to be submitted for midterm evaluation, and a project component – or demonstration of the craft – for your Final Project.

**5300. Introduction to 3D Animation**

Three credits. Prerequisite: Instructor consent.

Introduction to 3D animation emphasizing traditional animation principles as applied to 3D animation. Topics will include principles of animation, transformations and deformations of 3D objects, rigging, and rendering. Its purpose is to familiarize the students with working in a 3-D environment and build a working knowledge of the basic tools used in 3D animation. This course will be required for future advanced 3D related classes. Students will develop their skills using key-frame animation and the graph editor. Students will also learn techniques for researching & using reference. Students can apply skills learned in this class in other areas including game art, motion graphics and 2D Animation.

**5301. Advanced 3D Animation**

Three credits. Prerequisite: DMD 5300 and instructor consent.

Students bring characters to life, applying core animation principles learned in DMD 5300 to visually convey weight, force, self-impulse, and emotion to bipedal CG characters. Students leverage principles of human mechanics and classic animation process to analyze and interpret reference footage. Best practices are learned using industry standard 3D software, resulting in appealing character animation that is mechanically sound and communicates emotion.

**5305. History of Computer Graphics**

Three credits. Prerequisite: Instructor consent.

History of computer-generated imagery (CGI) from its beginnings to present. Students will learn how CGI began and the problems that existed in its infancy. Trends and future of computer animation and visual effects.

**5310. Introduction to 3D Modeling**

Three credits. Prerequisite: Instructor consent.

Creation of polygonal 3D models using industry standard modeling tools. The aesthetics of simplicity are important as it relates to edge flow and geometry construction for both software and real-time rendering application. Comprised of in class labs and take home tests. Labs and tests will assess and inform both the instructor and the student of their progress and overall modeling skill level.

**5311. Advanced Modeling, Lighting and Rendering**

Three credits. Prerequisite: Instructor consent.

Illumination of the connection between the audience and the image on screen. Students learn how lighting creates mood in a scene and the technical ways in which CG lighting is achieved. Students will learn what types of lights to use, how and when to use them, and techniques to achieve realistic lighting while being resource savvy. Lighting in theater as well as in traditional film will be studied to give students a solid understanding of why certain lighting choices are made and why they work, whether in live action or CG applications.

**5315. Character Rigging**

Three credits. Prerequisite: Instructor consent.

Rigging concepts with a specific emphasis on animated props and characters. Techniques for using and creating bones, constraints, skeletons, skinning, and weight painting. Students will come to understand the connection between animation and rigging, and specifically, how rigging increases quality and productivity in animation production.

**5320. Introduction to Lighting and Rendering**

Three credits. Prerequisite: Instructor consent.

Explanation of the connection between the audience and the image on screen. Students learn how lighting creates mood in a scene and the technical ways in which CG lighting is achieved. Students will learn what types of lights to use, how and when to use them, and techniques to achieve realistic lighting while being resource savvy. Lighting in theater as well as in traditional film will be studied to give students a solid understanding of why certain lighting choices are made and why they work, whether in live action or CG applications.

**5340. Compositing for Visual Effects**

Three credits. Prerequisite: Instructor consent.

Working with Film Students, students shoot plates on HD that fulfill the desire and needs

another. Will work with “client” to achieve the desired effect on time, and on-budget. The students hone their effects skills, as they learn to track the motion of on-set cameras, objects and elements. They will learn that the best way to do an effect isn’t always to pick up a computer mouse, but might be to go out and shoot elements to be manipulated in 2D after the fact.

**5350. Simulation and Technical Directing**

Three credits. Prerequisite: Instructor consent.

Art and science of creation of physical simulations using particle systems and collision detection. Creation of complicated rendering and compositing setups that make their animations both easier to render and more flexible within the bounds of any animation or VFX sequence.

**5420. Wearable Electronics and Interactive Objects**

(Also offered as DRAM 5420.) Three credits. Prerequisite: Instructor consent.

Provides a basic understanding of electronics, key components, function, construction, and project design.

**5440. Mobile Application Development 1**

Three credits. Prerequisite: DMD 5070; open only to Digital Media and Design graduate students; instructor consent required.

Provides an introductory experience into mobile application development. Through lecture and hands-on exercises, students will be introduced to the progresses, technologies, an environment or mobile applications. Emphasis will be on building simple android applications with the MIT App inventor to gain introductory knowledge of programming concepts and design.

**5470. Advanced Web Design and Development**

Three credits. Prerequisite: DMD 5070; open only to Digital Media and Design graduate students; instructor consent required.

Explores intermediate and advanced web design and development techniques, covering Cascading Style Sheets, XML, dynamic HTML with JavaScript, common frameworks, and the principles of site management. Through projects, the course will also cover more advanced design concepts in Website creation, such as efficient navigation design, designing or portability and accessibility, separating content from presentation for easy site updating and maintenance, planning interactivity, and search engine optimization.

**5500. Introduction to Digital Game Design**

Three credits. Prerequisite: Instructor consent.

Introduction to the principals of video game design and development. Exploration of the history of the industry, investigation of the theory of story, game mechanics and level progression, development of creativity skills that can be applied through an ideation process, and design and develop a 2D video game. Participation is conducted in a game-based environment.

**5522. The Story in Video Games**

One credit. Prerequisite: Instructor consent.

Focusing toward story and character development, students are challenged to generate an idea for a Role-Playing Video Game. Participants examine the relationship of story, character and player, investigate a selection of popular RPGs, and explore ways to visualize and

communicate their story and game idea to a group of would be investors.

### 5530. 3D Virtual World and Simulations

Three credits. Prerequisite: Instructor consent.

Students are challenged to design and develop a virtual simulation that will train, educate or replicate a historical, military or scientific event. Participants investigate a selection of different virtual environments, simulations and serious games, explore some of the basic principles of 3D modeling, and examine how game engines can be used to generate a three-dimensional computer-based environment.

### 5531. Game System Design

Three credits. Prerequisite: DMD 5500; open only to Digital Media and Design graduate students.

Students will be challenged to create a new game system within an existing game engine. This system will expand and change existing gameplay based on an in-class prompt. They will utilize their knowledge of player psychology and their analysis of other gameplay systems to develop a deeper understanding of the internal mechanics of games

### 5536. Disruptive Technologies in Games

Three credits. Prerequisite: DMD 5500 and 5542; open only to Digital Media and Design graduate students; instructor consent required.

Exploration of emerging interactive technologies, creating rapid-fire prototypes utilizing experimental hardware and software. These skills enable students to develop interactive installations and unique gameplay scenarios.

### 5540. Multiplayer Game Development

Three credits. Prerequisite: DMD 5531; open only to Digital Media and Design graduate students.

Students examine an array of gameplay interactions and how different types of interactions create a different experience for players. Students create a multiplayer map based in a relevant game engine that adheres or modifies the core mechanics to create a new game experience.

### 5542. Introduction to Scripting for Games

Three credits. Prerequisite: Open only to Digital Media and Design graduate students; instructor consent required.

Introduction to the fundamentals of gameplay scripting utilizing a current game engine. At the end of this course students will have a basic understanding of scripting concepts, constructs like numbers, strings, assignment, loops, functions, arrays and available engine commands.

### 5550. Game Production

Three credits. Prerequisite: DMD 5500; open only to Digital Media and Design graduate students; instructor consent required.

A practical examination into the successful management of video game products. Students in the class will be required to develop budgets, asset management plans and evaluate risk of game development options. As part of the design process, participants will explore relationship management, team management, investigate the business aspect of the video game industry, and deliver a series of documents as part of the development of video game project.

### 5560. Advanced Digital Game Design and Development

Three credits. Prerequisite: Instructor consent.

Practical examination into the development of three-dimensional video games. Students are required to design and develop a video game and extensive game design document. Participants explore a selection of advanced game engines, share and critique ideas, investigate the business aspect of the video game industry, and deliver a series of progress reports as part of the development of a video game project.

### 5700. Digital Media Strategies for Business

Three credits. Prerequisite: Instructor consent.

Introduction to digital media concepts and platforms that are being used in companies' marketing strategies and plans.

### 5710. Social Media Business Applications

Three credits. Prerequisite: DMD 5700 and instructor consent.

An introduction to social media marketing, focusing on the platforms and strategies being employed by brands.

### 5720. Digital Media Analytics

Three credits. Prerequisite: DMD 5700 and instructor consent.

Provides a working knowledge of the array of metrics and analytics needed to understand the digital consumer and measure the effectiveness of digital media marketing.

### 5730. Digital Consumer Behavior

Three credits. Prerequisite: Instructor consent.

Exploration and analysis of the changes in consumer decision-making and behavior in today's digital world.

### 5998. Variable Topics

Variable (1-6) credits. Prerequisites and recommended preparation vary. May be repeated for credit with a change of content.

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## Direct Service Elective (DSEL)

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### 5310. Current Trends in Family Intervention: Evidence-Based and Promising Practice Models of In-Home Treatment

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Exposes students to several nationally acclaimed Evidence-Based Practice (EBP) treatment programs for families that are widely practiced. Students are introduced to competencies associated with EBP and an overview of several empirically supported therapy programs that are designed to address psychiatric, behavioral and/or substance abuse concerns in children and adolescents including Multisystem Therapy (MST), Multidimensional Family Therapy (MDFT), Intensive Home Child and Adolescent Psychiatric Services (IICAPS), Functional Family Therapy (FFT) and Brief Strategic Family Therapy (BSFT). Case presentations from local providers of these models and testimonials from families.

### 5320. Direct Practice in School for Children with Educational Disabilities and Their Families

Three credits. Prerequisite: Open only to students in the M.S.W. program.

Meets state requirements for school work certification, approved by the Bureau of Certification and Professional Development. The practice of social work in schools requires that the social worker possess knowledge and skills to provide social work services for students with educational impairments and their families. To provide such service, the social worker must be able to engage in effective partnerships with parents and other multi-disciplinary team members and possess a repertoire of interventions appropriate for this population. Presents and discusses controversies and issues relative to labeling and testing procedures, such as the impact of racial and ethnic differences. Covers six areas of impairment as designated by law (Emotionally Impaired, Mentally Impaired, Learning Disabled, Autistic Impaired, Physically and Otherwise Health Impaired, and Speech and Language Impaired). Stimulates further study in impairment areas and lays a basic knowledge and skill foundation of social work services appropriate for these populations.

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## Dramatic Arts (DRAM)

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### 5000. Studies in Voice and Diction

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Voice-related topics and skills not included in DRAM 5001-5007. May include work in specialized areas of applied speech such as (but not limited to) analysis of heightened text, spoken choral performance, and oral interpretation of poetry or narrative prose.

#### 5001. Voice and Diction I

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

Development of breath support, vocal expressiveness, and basic diction, articulation, and phonetics skills.

#### 5002. Voice and Diction II

Three credits. Prerequisite: Instructor consent.

Developing vocal range and intelligibility with text and emotional content. Continued work with consonant and vowel sounds.

#### 5003. Voice and Diction III

Three credits. Prerequisite: Instructor consent.

Developing analytical and performance skills in heightened language and poetic text to be applied primarily to the works of Shakespeare and other classical playwrights.

#### 5004. Voice and Diction IV

Three credits. Prerequisite: Instructor consent.

Applying diction and phonetics skills to specialized speech styles including accents and dialects.

#### 5005. Voice and Diction V

Three credits. Prerequisite: Instructor consent.

Applying voice and diction skills to additional classical and contemporary dramatic forms.

#### 5006. Voice and Diction VI

Three credits. Prerequisite: Instructor consent.

Exploring additional vocal skills and resources required for professional acting.

**5007. Singing for Actors**

One credit. Prerequisite: Instructor consent. May be repeated for a total of three credits.

Developing singing skills required for performance in musical theatre productions.

**5110. Core Concepts in Arts Administration**

Three credits.

History of the field, principles and practices of arts management theory, leadership models, and contemporary issues facing arts organizations. Research methods and practices in the field.

**5111. Arts Administration Professional Internship**

Twelve credits.

Completion of an internship, at a professional arts organization, fulfills the internship requirement of the MFA in Arts Administration. Faculty assists in arranging internships at professional organizations.

**5112. Arts Administration Advanced Topic Research**

Three credits.

Coursework consists of a single major research project, or series of smaller projects, in preparation for the student's MFA project. The Advanced Topic Research project, or projects, may or may not be directly related to the candidate's MFA Project, but must serve in some direct way to help prepare the students for the MFA Project.

**5113. Arts Administration MFA Project**

Six credits.

The MFA Project is required for all MFA students completing the non-thesis option within the Graduate School at UConn. It must include evidence of all aspects of both conceptual learning and skill development training contained in the MFA Arts Administration program and must be approved by the graduate advisory committee. The MFA Project will also form the basis for the Final Examination, conducted by the advisory committee, as required by the Graduate School. The Final Examination will occur in the same semester as the submission of the MFA Project.

**5114. Arts Administration Studio I**

One credit.

Seminar-based course. Meets with Arts Administration Studio II, III, IV, and V. Case studies, and other forms of research, in arts administration.

**5115. Arts Administration Studio II**

One credit. Prerequisite: DRAM 5114.

Seminar-based course. Meets with Arts Administration Studio I, III, IV, and V. Case studies, and other forms of research, in arts administration.

**5116. Arts Administration Studio III**

One credit. Prerequisite: DRAM 5115.

Seminar-based course. Meets with Arts Administration Studio I, II, IV, and V. Case studies, and other forms of research, in arts administration.

**5117. Arts Administration Studio IV**

Three credits. Prerequisite: DRAM 5116.

Seminar-based course. Meets with Arts Administration Studio I, II, III, and V. Case studies, and other forms of research, in arts administration. Leadership models and techniques. Research projects required.

**5118. Arts Administration Studio V**

Three credits. Prerequisite: DRAM 5117.

Final in series of seminar-based courses. Meets with Arts Administration Studio I, II, III, and IV. Case studies, and other forms of research, in arts administration. Leadership models and techniques. Research projects required.

**5120. Financial Management for the Arts**

Three credits.

An introduction to key elements of nonprofit financial management in the arts, including basic accounting, financial statement analysis, and budgeting. Using current articles, reference texts, and business cases, students will develop an understanding of nonprofit accounting and will follow daily transactions through to the financial statements. The relationships between budgeting, financial reporting, and financial statements will be explored using readings and case studies.

**5121. Governance and Leadership in the Arts**

Three credits.

This course will provide instruction in basic concepts of governance and leadership of nonprofit arts organizations by focusing on how arts organizations are structured, how they function, and a particular emphasis on how they are led.

**5122. Fund Raising and Development for the Arts**

Three credits.

This course addresses best practices for fund raising and development for arts organizations including practical exercises and case study analysis.

**5123. Marketing the Arts**

Three credits.

Build knowledge of marketing theories, approaches, and methodologies that are used across all industries and then highlight their application for the arts. Develop an understanding of the following areas: analysis of the competitive environment; developing audience insight and segmentation; positioning and targeting a unique value proposition; developing and delivering the unique value proposition; and evaluating the performance of techniques.

**5130. Introduction to Graduate Studies in Stage Design**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Projects in scenery, lighting and costume design for first-year graduate students in stage design and puppetry. Reading and discussion of various 20th century works on design theory for the theatre.

**5131. Studies in Theatre History**

Variable (1-3) credits. Prerequisite: Instructor consent.

A survey course focusing on selected dramatic writings from Classic Greek to the 21st century. The application of text analysis tools for the actor will be examined.

**5132. Survey of 20th Century Theatrical Design**

Three credits.

A survey of the basic aesthetics available to the modern theatre designer, seen through the lens of designers and design movements of the 20th century. The use of form, color, scale, materials, and their relative importance will be examined, as

will the concepts of stylization, theatricality, and abstraction.

**5159. Practicum in Theatre Studies**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Special projects in Theatre Studies, usually related to a production of the Department of Dramatic Arts/Connecticut Repertory Theatre.

**5189. Field Studies Internship in Design/ Technical Theatre**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Supervised practical experience in professional/regional theatres or academic institutions.

**5190. Internship in Dramatic Arts**

Zero credits. Prerequisite: Open only to Dramatic Arts graduate students holding a dramatic arts graduate assistantship; instructor consent required.

Internships in acting, costuming, lighting, management, media, puppetry, pedagogy and technical theatre.

**5192. Independent Study in Theatre Studies**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Independent study under the direction of an appropriate faculty member.

**5197. Special Topics in Theatre Studies**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

A reading course under the direction of an appropriate staff member.

**5200. Studies in Technical Production**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

Study of any topics in in Stagecraft, Technical Production, or sound not included in DRAM 5201-5213.

**5201. Production Drafting**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Emphasis on preparation of plans appropriate for scenic studio bidding procedures.

**5202. Technical Direction**

Three credits. Prerequisite: Instructor consent.

A study of the planning, management and execution of all technical aspects of production.

**5204. Technical Analysis**

Three credits. Prerequisite: Instructor consent.

Analysis of scenic structures and materials, including stress and vector analysis, static and dynamic loading of beams and battens, truss design, and time/cost studies.

**5205. Audio Production**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Audio recording and playback techniques used in the preparation of theatrical sound scores.

**5206. Sound Technology**

Three credits. Prerequisite: Instructor consent.

Application of signal processing devices and signal modification for specialized audio effects for production.

**5207. Electricity and Electronics for the Theatre**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Study of current electrical technology and applications, including AC theory and codes.

**5208. Computer Applications**

Three credits. Prerequisite: Instructor consent.

Survey of current software available for application to production management and technical design and production.

**5209. Studies in Theatre Design**

Three credits. Prerequisite: Instructor consent.

Investigates the physical problems and codes involved in integrating theatre technology into the architectural requirements of a performance facility.

**5211. Advanced Rigging Techniques**

Three credits. Prerequisite: Instructor consent.

Technology and materials used in conventional and specialized rigging systems.

**5212. Shop Technology**

Three credits. Prerequisite: Instructor consent.

Use of materials, equipment and processes required in special fabrication techniques.

**5213. Stage Technology**

Three credits. Prerequisite: Instructor consent.

Power sources and drive mechanisms for stage machinery including electro-mechanical, hydraulic and pneumatic systems.

**5292. Independent Study in Technical Theatre**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

An independent project course under the direction of an appropriate staff member.

**5296. MFA Project in Technical Theatre**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

A major technical direction project for a production in the Department of Dramatic Arts/ Connecticut Repertory Theatre.

**5297. Special Topics in Technical Production**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

A reading course under the direction of an appropriate staff member.

**5300. Studies in Scenic Design**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

Study of any topics in Scenic Design not included in DRAM 5301-5320.

**5301. Scenic Design: Single Set Plays**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

Exploration of the various methods of solving the scenic design for plays requiring only one location.

**5302. Scenic Design: Multi-Set Play**

Three credits. Prerequisite: Instructor consent.

Investigating the range of methods of solving the scenic design for plays with several locations.

**5303. Scenic Design: The Musical I**

Three credits. Prerequisite: Instructor consent.

Solutions for designing scenery for the Traditional American Musical. This topic

examined from both historical and contemporary points of view.

**5304. Scenic Design: The Musical II**

Three credits. Prerequisite: DRAM 5303; instructor consent required.

The examination and study of scenery-design solutions for complex musicals in unconventional spaces.

**5305. Scenic Design: Art Direction for TV and Film**

Three credits. Prerequisite: Instructor consent.

Developing skills for relating traditional scenic design to feature films and television with an emphasis on creating storyboards.

**5306. Scenic Design: Opera and Ballet**

Three credits. Prerequisite: Instructor consent.

Operas and Ballets from around the world will be analyzed and designed for various proscenium theatres.

**5310. Scenic Design: Event Planning**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

Examining approaches to designing special events for unique spaces.

**5311. Scenic Design: Design Drafting**

Three credits. Prerequisite: Instructor consent.

The study of hand-drafting styles and conventions, and the study of computer drafting software and techniques.

**5312. Scenic Design: Perspective Drawing and the Pencil Sketch**

Three credits. Prerequisite: Instructor consent.

A study of one point, two point, three point and measured perspective in order to create pencil sketches for the theatre.

**5313. Scenic Design: The Color Sketch**

Three credits. Prerequisite: Instructor consent.

Techniques and skills for building a scale model for a scenic design using a variety of materials and methods.

**5314. Scenic Design: Model Building Techniques**

Three credits. Prerequisite: Instructor consent.

Techniques and skills for building a scale model for a scenic design using a variety of materials and methods.

**5315. Scenic Design: Rendering with Watercolor**

Three credits. Prerequisite: Instructor consent.

The study of how to use watercolor to create the theatrical sketch.

**5316. Scenic Design: Computer Rendering for the Theatre**

Three credits. Prerequisite: Instructor consent.

The use of mainstream computer programs to create digital renderings and media for the theatre.

**5317. Scenic Design: 3D Computer Rendering for the Theatre**

Three credits. Prerequisite: Instructor consent.

The use of mainstream 3D programs to render and draft scenic designs for the theatre.

**5318. Scenic Design: Creating a Portfolio On and Off Line**

Three credits. Prerequisite: Instructor consent.

Students will create a dynamic, interesting portfolio for off-line presentations and then turn that portfolio into a web site.

**5319. Scenic Design: Styles of Ornamentation**

Three credits. Prerequisite: Instructor consent.

An exploration of architecture and period style from the earliest times to the present.

**5320. Scene Painting**

Three credits. Prerequisite: Instructor consent.

Scene painting using a variety of media and techniques. The student also explores a number of faux finish techniques.

**5329. Technical Research and Writing**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Application of writing techniques and research methods used in preparation of technical reports and project documentation.

**5392. Independent Study in Scenic Design**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Independent study under the direction of an appropriate faculty member.

**5396. MFA Project in Scenic Design**

Variable (3-6) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

The design of costumes for a production in the Department of Dramatic Arts/Connecticut Repertory Theatre.

**5397. Special Topics - Scenic Design**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

A reading course under the direction of an appropriate staff member.

**5401. Costume Design: Poetic Realism**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

An examination of the relationship between poetic realism and costume design, explored through a series of design projects.

**5402. Costume Design: Comic Exaggeration**

Three credits. Prerequisite: Instructor consent.

An examination of the relationship between comedy and costume design, explored through a series of design projects.

**5403. Costume Design: Tragedy and Post Modernism**

Three credits. Prerequisite: Instructor consent.

An examination of the relationship between tragedy and costume design and also between post modernism and costume design explored through a series of design projects.

**5404. Costume Design: Fantasy and Opera**

Three credits. Prerequisite: Instructor consent.

An examination of the relationship between fantasy and costume design and also between opera and costume design explored through a series of design projects.

**5405. Costume Design: Dance and Musicals**

Three credits. Prerequisite: Instructor consent.

An examination of the relationship between dance and costume design and also between musicals and costume design explored through a series of design projects.

**5406. Costume Design: Performance Art**

Three credits. Prerequisite: Instructor consent.

An examination of the relationship between performance art and costume design, explored through a series of design projects.

**5407. Costume Design: Film**

Three credits. Prerequisite: Instructor consent.

An examination of the relationship between film and costume design, explored through a series of design projects.

**5410. Studies in Applied Costume Craft**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit with change of topic.

Study of any topic in applied costume craft not included in DRAM 5411-5421.

**5411. Color Theory / Light and Fabric**

Three credits. Prerequisite: Instructor consent.

The first part of this course focuses on the study of textile names and properties. The second part of the course explores the relativity of color, color properties, and the interaction of light and color.

**5412. Dyeing and Fabric Modification**

Three credits. Prerequisite: Instructor consent.

Focusing on dyes and their interaction with various fabrics and selecting the correct dyes and the colors to achieve the desired effects. Investigating new fiber-modification technology.

**5413. Computer Costume Rendering and Website Design**

Three credits. Prerequisite: Instructor consent.

The use of mainstream computer programs to create digital renderings as part of the costume-design process. Learning how to use those images along with computer manipulated production photos for presentation on the web.

**5414. Costume Design: Period Costume Rendering**

Three credits. Prerequisite: Instructor consent.

Exploring sketching techniques with a variety of media while learning to capture period fabrics and styles using primary source images for research and inspiration.

**5415. Advanced Make-up: Prosthetics and Wigs**

Three credits. Prerequisite: Instructor consent.

Acquiring techniques for creating period effects in make-up and hairstyles. Learning proper wig ventilation and safe casting practices for gelatin and latex prosthetics.

**5416. Costume Design: Millinery Techniques**

Three credits. Prerequisite: Instructor consent.

Acquiring techniques for designing and constructing different types and styles of men's and women's hats from various historic periods.

**5417. Costume Design: Flat Pattern Costume Drafting**

Three credits. Prerequisite: Instructor consent.

Focusing on the art and mathematical formulas that create a basic sloper for patterning garments. Understanding shaping through dart manipulation, curved seams, and inserted panels or shapes.

**5418. Costume Design: Draping Patterns**

Three credits. Prerequisite: Instructor consent.

Developing techniques, for draping shapes and patterns over a dress-maker's mannequin, using the

drape of various fabrics and the straight of the grain (versus the bias) to create specific effects.

**5419. Tailoring Period Costumes for the Theatre**

Three credits. Prerequisite: Instructor consent.

Exploring the traditional art of tailoring and various patterning techniques for constructing garments from the major historical periods often depicted on the stage or screen.

**5420. Wearable Electronics and Interactive Objects**

(Also offered as DMD 5420.) Three credits. Prerequisite: Instructor consent.

This course provides a basic understanding of electronics, key components, function, construction, and project design.

**5492. Independent Study in Costume Design**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Independent study under the direction of an appropriate faculty member.

**5494. Costume Design Seminar**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

This course provides an avenue for discussion and learning activities related to realized design work and career development. Each week, students will present to the group the most recent development of their work on CRT assignments, D-Series, and professional jobs, allowing for a group discussion of best practices, next steps, and group problem-solving of challenges. This course will additionally be used for ongoing career development work such as regular resume, website, and portfolio critiques, as well as for discussion of career opportunities, contract negotiations, and professional expectations and processes.

**5496. MFA Project in Costume Design**

Variable (3-6) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

The design or assistant design of costumes for a production in the Department of Dramatic Arts/Connecticut Repertory Theatre.

**5497. Special Topics in Costume Design**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

A reading course under the direction of an appropriate staff member.

**5500. Studies in Lighting Design**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit with change of topic

Study of any topics in lighting design not included in DRAM 5501-5514.

**5501. Lighting Design: The Single Set Play**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

The development of lighting designs for single set dramas and musicals.

**5502. Lighting Design: Opera**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

The design process for operatic theatre, emphasizing concepts and visual metaphors for the lighting of opera.

**5503. Lighting Design: Dance**

Three credits. Prerequisite: Instructor consent.

The methods and process of creating a dance lighting design while learning how to document and communicate ideas, analyze movement, and understand the vocabulary of the dance world.

**5504. Lighting Design: The Broadway Musical**

Three credits. Prerequisite: Instructor consent.

The design process for musical theatre productions, developing concepts and visual metaphors to be used in lighting musicals.

**5505. Lighting Design: Non-Proscenium Spaces**

Three credits. Prerequisite: Instructor consent.

The design process for productions within non-proscenium and non-traditional spaces, emphasizing production concepts and visual metaphors for lighting thrust stages, black box spaces, hotel ballrooms, arenas, public spaces, and outdoor venues.

**5506. Lighting Design: Angles and Systems**

Three credits. Prerequisite: Instructor consent.

Tracing how, from initial concept to final plot, Lighting Concept and Visual Metaphor influence lighting angles, textures, and the positioning of fixtures. Using side light, back light, booms, ladders, box booms, coves, and cyc lighting to realize the range of designer choices.

**5508. Lighting Design: From Concept to Opening Night**

Three credits. Prerequisite: Instructor consent.

Following a lighting design from its conception through to its opening night. Exploration of multiple genres of theatre including drama, musicals, dance, opera, events and concerts.

**5509. Lighting Design: Concept Development**

Three credits. Prerequisite: Instructor consent.

Importance of lighting concept and visual metaphor in developing a show's design. Tools and strategies (scene break-down, mood boards, concept statement, concept presentation, and others) for communicating with the director and other production personnel.

**5512. Lighting Technology**

Three credits. Prerequisite: Instructor consent.

Applying the technologies for lighting, dimming, video projection, and LED imaging design to the protocols used in contemporary lighting and projection design for theatre, live events, and architecture.

**5513. Lighting Computer Applications**

Three credits. Prerequisite: Instructor consent.

Developing skills in 2D and 3D digital animation using current media programs for theatrical, concert, corporate and architectural projection.

**5514. Production Lighting Design and Business Practices**

Three credits. Prerequisite: Instructor consent.

Advanced study of a lighting designer's role and the design process from interview through completed design. Additional focus on the marketing, financial, and personnel elements of the lighting-design business.

**5515. History of Lighting Design**

Three credits.

Historical survey of how practitioners of lighting and theater design have been able to develop lighting technology and the concept of lighting design from the time of the Renaissance to the present day. Particular attention will be given to the eras of transition in the technology of producing light: from candlelight to gaslight, and from gaslight to the early electric era. The effects of the new light on performance style and the changes that ensued will be discussed.

#### **5516. Lighting Design: Non-Traditional Performance**

Three credits.

Concentrates on the unique conceptual, stylistic, and technical problems of lighting performances that fall outside the category of traditional theatre, dance, and opera productions. Develops proficiency in recognizing and meeting the unique challenges these types of productions pose for designers.

#### **5517. Projection and Lighting Design**

Three credits.

Concentrates on the increasingly important relationship between projected images and lighting design in the modern theatre. Live performances are using a variety of new methods to incorporate projection technology, and the role of the lighting designer is distinct in productions of this kind. The goal of this class is to discover ways to use projections and light to form 3-dimensional space in ways that knit the properties of the projection and the composition of the space into an environment that humans can inhabit and perform in.

#### **5530. Studies in Digital Media**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits with a change of topic.

Study of any topics in visual Digital Media not included in DRAM 5531-5535.

#### **5531. Digital Design for Projections I**

Three credits. Prerequisite: Instructor consent.

Advanced exploration of the philosophy, software, hardware, and technology used to create digital imagery, including video-projection and LED system designs. Special emphasis is on the aesthetics of media design and the systems for displaying digital imagery.

#### **5532. Digital Design for Projections II**

Three credits. Prerequisite: Instructor consent.

Building on Projections I, students conceive, design, and produce digital media for video projection using LED systems, particular emphasis on exploring and developing aesthetics of digital media design.

#### **5533. 2D Digital Animation I**

Three credits. Prerequisite: Instructor consent.

With 2D animation and compositing programs currently used in film, television, commercial and corporate production, students will explore digital media development and design, beginning with principles of composition, design, and production and moving on to the composition of 2D graphic elements.

#### **5534. 2D Digital Animation II**

Three credits. Prerequisite: Instructor consent.

Expanding on 2D Animation I, students will explore 3D space (or the "Z dimension"), learning

to manipulate the camera around objects in space. This study will focus on the basics of the digital camera, virtual lighting, and the value of shadow relative to image development and recognition.

#### **5535. 3D Digital Animation I**

Three credits. Prerequisite: Instructor consent.

Using professionally current 3D computer-animation programs, this study begins with virtual scene development. Students will then construct a 3-dimensional space, model 3D objects within that space, create and map textures and finishes onto that object, and then animate it.

#### **5592. Independent Study in Lighting Design**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Independent study under the direction of an appropriate faculty member.

#### **5596. MFA Project in Lighting Design**

Variable (3-6) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

The lighting design for a production in the Department of Dramatic Arts/Connecticut Repertory Theatre.

#### **5597. Special Topics in Lighting Design**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

A reading course under the direction of an appropriate staff member.

#### **5600. Studies in Puppet Arts**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Study of any topics in puppet design, construction, or performance not covered in DRAM 5601-5618. May be repeated for credit with a change in topic.

#### **5601. Advanced Mask**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

Study of mask design, construction and performance through practical work with face casting, neutral masks, exaggerated masks, and Commedia dell'Arte masks.

#### **5602. Advanced Paper Sculpture**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

Practice in design, sculpting, patterning, and finishing techniques using the "Roser Papier Methode" for Puppetry leading to full realization and performance of the sculptures as puppets.

#### **5603. Puppet Theatre Production**

Three credits. Prerequisite: Instructor consent. May be repeated credit.

Strategies for developing and executing the skills involved in mounting Puppet Productions, includes planning, scripting, designing, scheduling, budgeting, and identifying appropriate personnel.

#### **5604. Advanced Rod Puppet Theatre**

Three credits. Prerequisite: Instructor consent.

Consideration of a world-wide range of design, construction, and manipulation techniques for several forms of Rod Puppets, with emphasis on Chinese performance skill development.

#### **5605. Advanced Puppetry in Television**

Three credits. Prerequisite: Instructor consent.

Research and practical exploration of techniques for presenting Puppet Arts on television, includes planning, design, construction and performance of a short program and development using current video editing software.

#### **5607. Advanced Materials Techniques**

Three credits. Prerequisite: Instructor consent.

Puppet Character design using a full range of fabrication techniques (including sculpting, molding, casting, painting, and carving) to design and fully realize a puppet character.

#### **5608. Marionette Performance**

Three credits. Prerequisite: Instructor consent.

Exploration and skill development with the pendular attributes of a string puppet using several different performance figures.

#### **5609. Marionette Construction**

Three credits. Prerequisite: Instructor consent.

Design, construction and performance of a full figure string puppet.

#### **5610. Advanced Hand Puppet Theatre**

Three credits. Prerequisite: Instructor consent.

Consideration of a world-wide range of design, construction, and manipulation methods for Hand Puppetry, Glove Puppetry, and mouth-moving skills.

#### **5611. Advanced Ultraviolet Light/Czech Black Theatre**

Three credits. Prerequisite: Instructor consent.

Exploration of U.S. applications of UV (Black Light) and Czech Black Theatre (Curtain of Light) and its practical application to Puppet Theatre.

#### **5612. ISM's: Art Movements of the Early 20th Century**

Three credits. Prerequisite: Instructor consent.

Examination of Puppet Arts' contributions to the Art Movements of the Early 20th Century, including the production of a Puppet Arts event within a selected "ism."

#### **5613. Advanced Shadow Theatre**

Three credits. Prerequisite: Instructor consent.

Research and study of all design, story, construction, and performance elements within worldwide Shadow Theatre for both direct-screen and projected presentations.

#### **5614. Puppet Production Seminar**

Three credits. Prerequisite: Instructor consent.

Dramaturgical, directorial and design research and study related to current department productions using Puppetry.

#### **5615. Puppet Arts Aesthetics**

Three credits. Prerequisite: Instructor consent.

Research and study of the myriad forms of Puppet Arts expression and the aesthetics that guide them.

#### **5616. Trends in Contemporary American Puppet Theatre**

Three credits. Prerequisite: Instructor consent.

An in-depth study of Puppetry as it has been practiced in North America from pre-colonial days to the present.

#### **5617. World Puppet Theatre**

Three credits. Prerequisite: Instructor consent.

A worldwide survey of the Puppet Arts as they are practiced in religious expression, societal

commentary, cultural celebration, and public entertainment.

#### **5618. Production Planning and Development**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Students independently research, conceptualize, and prepare preliminary scripts or designs for future performance projects.

#### **5619. Movement-Based Performance for the Puppet Theatre I**

Three credits.

Designed to awaken and develop imaginative and skilled theatrical performers through the exploration of movement concepts, movement-based theatre techniques and devising work. Develop performance skills, imagination, creativity, and ability to devise original and inspired theatre work. Will include a component of a rigorous physicality using elements of creative movement, physical theatre, and yoga to allow freedom of mind and body.

#### **5620. Directing for Puppet Theatre I**

Three credits.

Designed to awaken, develop, and prepare innovative directors in the field of Puppet (but also Alternative) Theatre in the 21st century. Study of the historic and theoretical foundations of theatre directing. Develop understanding of narrative structure. Engagement in practical exercises designed to develop directorial skills.

#### **5692. Independent Study in Puppet Arts**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Independent study under the direction of an appropriate faculty member.

#### **5696. MFA Project in Puppetry**

Variable (3-6) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Major artistic contribution(s), (writing, designing, building, directing) to a puppetry production or related theatre or film project in the Department of Dramatic Arts/Connecticut Repertory Theatre.

#### **5697. Special Topics in the Puppet Arts**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

A reading course under the direction of an appropriate staff member.

#### **5700. Studies in Professional Acting**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Topics and skills not taught in DRAM 5701-5706. May include work with the techniques of specific master acting teachers such as (but not limited to) Sanford Meisner, Stella Adler, Tadashi Suzuki, and Utah Hagan. May be repeated with change of topic.

#### **5701. Professional Acting I**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Acquiring core tools and exploring skills required for professional acting. Applying basic skills to a full-length Shakespeare (or other heightened language) performance project.

#### **5702. Professional Acting II**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Exploring and applying the core techniques required for acting in realistic and naturalistic plays; including the principles of characterization.

#### **5703. Professional Acting III**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Developing and applying skills for acting through poetic language with particular attention paid to acting Shakespeare and the Folio's Guide for the Actor.

#### **5704. Professional Acting IV**

Three credits. Prerequisite: Instructor consent.

Working with techniques and styles for performing comedy; both in scripted plays and other performance modes.

#### **5705. Professional Acting V**

Three credits. Prerequisite: Instructor consent.

Additional work in analyzing and performing contemporary scripts written for both stage and screen.

#### **5706. Professional Acting VI**

Three credits. Prerequisite: Instructor consent.

Preparation for the world of professional theatre, including development of audition techniques, learning the workings of the industry, and establishing career connections.

#### **5721. Performance Techniques**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

Performance study and practice in selected areas of dramatic arts.

#### **5759. Practicum in Performance**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Special projects in performance, usually related to a production of the Department of Dramatic Arts/Connecticut Repertory Theatre.

#### **5792. Independent Study in Performance**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Independent study under the direction of an appropriate faculty member.

#### **5796. MFA Project in Performance**

Variable (3-6) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Research and preparation for an assigned MFA performance project, usually acting a major role in a production of the Department of Dramatic Arts/Connecticut Repertory Theatre.

#### **5800. Studies in Movement for the Actor**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Topics and skills not normally included in DRAM 5801-5807. Content may include (but is not limited to) stage violence, armed or unarmed combat, gymnastics, and T'ai Chi. May be repeated with changes in topic.

#### **5801. Movement for the Actor I**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Exploration of the actor's physical instrument.

#### **5802. Movement for the Actor II**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Physical conditioning and techniques of characterization.

#### **5803. Movement for the Actor III**

Three credits. Prerequisite: Instructor consent.

Exploration of theatrical styles in the dramatic space, including work in the Commedia form.

#### **5804. Movement for the Actor IV**

Three credits. Prerequisite: Instructor consent.

Physical expression for the actor through expressive mask work and physical storytelling.

#### **5805. Movement for the Actor V**

Three credits. Prerequisite: Instructor consent.

Developing styles of comedic physical movement, including the art of clowning.

#### **5806. Movement for the Actor VI**

Three credits. Prerequisite: Instructor consent.

Continued development of styles and techniques for expressive movement and their application to the world of Physical Theatre.

#### **5807. Alexander Technique for the Actor**

One credit. Prerequisite: Instructor consent.

Body alignment, release, and constructive rest techniques developed by F. M. Alexander are applied to actors' posture, movement, and breathing.

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## **Ecology and Evolutionary Biology (EEB)**

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#### **5050. Fundamentals of Ecological Modeling**

Four credits. Two lectures and one 2-hour laboratory. Prerequisite: STAT 1000Q or 1100Q or 3445 or 5005 or 5505; or equivalent with instructor consent.

Quantitative inference from ecological and environmental data. Choosing modeling methods based on knowledge of biological processes. Frequentist and Bayesian approaches; analysis of real and simulated data sets.

#### **5100. Preparing for a Career in Ecology and Evolutionary Biology**

One credit. Prerequisite: Open to first and second year graduate students in EEB, others with permission.

Introduction to the design and execution of scientific research, career planning, communication of science to multiple audiences, and broader impacts of scientific work.

#### **5110. Writing Research Proposals and Fellowship Applications**

Two credits. Prerequisite: Open only to Ecology and Evolutionary Biology graduate students; instructor consent required. May be repeated for a maximum of six credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The craft of writing persuasive fellowship applications and funding proposals in ecology, evolutionary biology, systematics, and conservation biology. Students apply for financial support from agencies, foundations, and other sources. Includes peer review.

**5200. Biology of Fishes**

Four credits. Prerequisite: Instructor consent.

Introduction to the biology of fishes, with an emphasis on adaptation and evolutionary diversification. Topics include the evolution of major groups, morphology, physiology, behavior, and population and community ecology. Lectures, critical discussions of current journal articles, student presentations, and exercises in the field and laboratory. A research paper and class presentation are required on a topic pre-approved by the instructor.

**5203. Developmental Plant Morphology**

Four credits.

Exploration and analysis of diversity in plant form using basic principles of plant construction and development. A research paper is required, in which the principles learned in lecture are applied to the analysis of the development of a plant from seed through reproductive maturity.

**5204. Aquatic Plant Biology**

Four credits.

Field and laboratory-oriented study of the anatomy, morphology, ecology, physiology, systematics and evolution of vascular aquatic and wetland plants. A research paper and class presentation are required on a topic pre-approved by the instructor.

**5215. Physiological Ecology of Animals**

Three credits. Prerequisite: Instructor consent.

Physiology of animals in an evolutionary context. Lectures and critical discussions of current journal articles. A research paper and class presentation are required on a topic pre-approved by the instructor.

**5220. Evolution of Green Plants**

Four credits.

Evolution of morphological and genomic traits marking the conquest of land, the diversification of land plants, and the significance of plants in the evolution of life on earth, global climates and human civilizations. Laboratory session includes study of morphological and anatomical characters of extant and fossil plants, phylogenetic inference from morphological and molecular characters, and discussion of primary literature.

**5240. Biology of Bryophytes and Lichens**

Four credits.

Diversity, evolution, ecology, development and taxonomy of the bryophytes (mosses, liverworts, and hornworts) and lichen-forming fungi.

**5250. Biology of the Algae**

Four credits.

Laboratory and field-oriented study of the major groups of algae, emphasizing structure, function, systematics, and ecology.

**5254. Mammalogy**

Four credits.

Lectures cover diversity, natural history (including behavior, ecology, reproduction, etc.), and evolution of mammals; readings from original literature are included. Laboratories cover anatomy, systematics, and distribution of major groups of mammals.

**5265. Herpetology**

Four credits. Prerequisite: Instructor consent.

Lectures cover environmental physiology, ecology, and behavior of amphibians and reptiles. Emphasis is on readings from the original literature. Laboratories cover evolution, systematics, and distribution of major groups of the world.

**5271. Systematic Botany**

Four credits. Prerequisite: Instructor consent.

Classification, identification, economic importance, evolution and nomenclature of flowering plants. Laboratory compares vegetative and reproductive characteristics of major families. A research paper and class presentation are required on a topic pre-approved by the instructor.

**5300. Practical Genomics in Ecology and Evolution**

Three credits. Prerequisite: Open only to graduate students in biological sciences and related fields, others with consent.

Computational biology skills. Focused training on analytical approaches for genomic data generated in ecology and evolutionary biology. Practical activities include writing basic scripts, accessing public data repositories, and analyzing genomic data with existing open source software to answer questions of biological interest.

**5301. Population and Community Ecology**

Three credits. Prerequisite: Open only to Ecology and Evolutionary Biology graduate students, others with consent.

Overview of population and community ecology, including population regulation and dynamics, metapopulations, species interactions, biodiversity, community structure, and evolutionary ecology. Theoretical and case-history approaches, emphasizing plants, invertebrates, and vertebrates. Lecture, discussion, and exercises in analysis and modeling.

**5310. Conservation Biology**

Three credits.

Case studies and theoretical approaches to conservation of biological diversity, genetic resources, plant and animal communities, and ecosystem functions. Topics emphasize ecological and evolutionary principles that form the scientific basis of this emerging, interdisciplinary field, as well as socio-political, legal, economic, and ethical aspects of conservation.

**5333. Evolutionary Developmental Biology**

Three credits.

Advanced course in evolutionary biology, emphasizing the underlying developmental bases of evolutionary change. Concepts of homology, constraint, and heterochrony, with examples from both animal and plant systems.

**5335W. Vertebrate Social Behavior**

Three credits.

Lectures and discussions dealing with various aspects of vertebrate social behavior, including territoriality, mating systems, sexual selection, and group behavior. The emphasis is on reading and critical analysis of original literature.

**5347. Principles and Methods of Systematic Biology**

Four credits. Prerequisite: Instructor consent.

Basic concepts and modern procedures employed in systematic biology: literature retrieval, species description, phylogenetic inference, nomenclature, and current conceptual

issues. Laboratories include computer techniques in phylogenetic analysis.

**5348. Population Genetics**

Three credits.

Provides a theoretical background for studies in evolution. Emphasis is placed on understanding the conceptual foundations of the field and on the application of these concepts to an understanding of the roles of mutation, evolution of populations.

**5349. Phylogenetics**

Four credits. Prerequisite: EEB 5347.

Estimation of genealogies at the level of species and above, and their application and relevance to various biological disciplines, including systematics, ecology, and morphological and molecular evolution. Surveys both parsimony and model-based methods, but emphasizes maximum likelihood and Bayesian approaches.

**5350. Molecular Systematics**

Two credits. Prerequisite: Instructor consent.

Exploration of key literature focusing on the practical aspects of incorporating knowledge of DNA sequence evolution into phylogenetic tree construction. Laboratory methods for collection of molecular data including management, extraction, amplification, and sequencing.

**5360. Functional Ecology of Plants**

Three credits.

Physiological, morphological, and structural responses of plants to the physical and biotic environment and to environmental change. Readings, lectures and discussions emphasize plant responses at all levels of organization, from cells to whole plants. Themes include organismal integration, consequences and constraints in plant adaptation, and the functioning of plants within communities and ecosystems.

**5369. Current Topics in Biodiversity**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature on biodiversity.

**5370. Current Topics in Conservation Biology**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature on conservation.

**5449. Evolution**

Three credits.

A review of our current understanding of the patterns and processes of organic evolution. Class periods will include discussion and critical analysis of primary literature.

**5477. Insect Phylogeny**

Three credits.

A review of our current understanding of the evolutionary relationships of the major orders and families of insects, including the phylogenetic position of Insecta within Arthropoda.

**5500. Introduction to Natural History Collections**

One credit. Prerequisite: Open only to Ecology and Evolutionary Biology graduate students; instructor consent required. Students taking this course will

be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Training required for work in the EEB Biodiversity Research Collections Facility. The uses of natural history collections; policies, resources, and databases of the Collection Facility; specimen preparation and labeling; legal and ethical issues; threats to natural history collections.

**5881. Internship in Ecology, Conservation, or Evolutionary Biology**

Zero credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

An internship with a non-profit organization, a governmental agency, or a business under the supervision of Ecology and Evolutionary Biology faculty. Activities relevant to the practice of ecology, biodiversity science, evolutionary biology, or conservation biology will be planned and agreed upon in advance by the job site supervisor, the faculty coordinator, and the intern.

**5889. Research**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Conferences and laboratory work covering selected fields of Ecology and Evolutionary Biology.

**5891. Internship in Ecology, Conservation, or Evolutionary Biology**

Variable (1-9) credits. Prerequisite: Instructor consent. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

An internship with a non-profit organization, a governmental agency, or a business under the supervision of Ecology and Evolutionary Biology faculty. Activities relevant to the practice of ecology, biodiversity, evolutionary biology, or conservation biology will be planned and agreed upon in advance by the job site supervisor, the faculty coordinator, and the intern. One credit may be earned for each 42 hours of pre-approved activities up to a maximum of nine credits.

**5894. Seminar**

Variable (1-3) credits. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Study and discussion of current researches, books and periodicals in the field of Biology. Subtopic designations: Ec, Ecology; M, Mammalogy; Mec, Marine Ecology; Pr, Parasitology; En, Entomology; Bi, Biogeography; Ev, Evolution; Sy, Systematics.

**5895. Investigation of Special Topics**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Advanced study in a field within Ecology and Evolutionary Biology.

**5899. Independent Study**

Credits and hours by arrangement, not to exceed three. Prerequisite: Instructor consent. May be repeated for up to six credits with change in content.

A reading course for those wishing to pursue special work in biology. It may also be elected by undergraduate students preparing to be candidates for degrees with distinction.

**6480. Seminar in Vertebrate Biology**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature in vertebrate biology.

**6481. Seminar in Biodiversity**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Provides the opportunity for students to present research plans, reports of work in progress, and full-length seminars on completed research projects in ecology, systematics, and evolutionary biology to a supportive but critical audience.

**6482. Seminar in Spatial Ecology**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature in spatial ecology.

**6483. Seminar in Marine Biology**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature in marine biology.

**6484. Seminar in Plant Ecology**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature in plant ecology.

**6485. Seminar in Comparative Biology**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature in evolution and comparative ecology.

**6486. Seminar in Systematics**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature in systematic biology.

**6487. Seminar in Parasitology**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature in parasitology.

**6490. Seminar in Behavioral Ecology**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Analysis and discussion of current literature in behavioral ecology.

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**Economics (ECON)**

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**5101. European Economic History**

Three credits.

The economic development of Europe from the Industrial Revolution to World War I. Emphasis on the economic and social factors that led to the industrialization of Europe.

**5110. History of Economic Thought**

Three credits.

History and methodological underpinnings of economic ideas from ancient times to the present. Particular attention to Smith, Marx, Marshall, and Keynes.

**5128. Economic Rights**

(Also offered as HRTS 5390.) Three credits. Prerequisite: Instructor consent.

Explores the conceptual bases, measurement, and policy applications of economic rights. Specific topics will include: child labor, the right to development, non-governmental initiatives, and the institutionalization of economic rights (e.g., constitutionalization versus statutory implementation versus discretionary policies).

**5201. Microeconomics**

Three credits. Not open for credit to students who have passed ECON 2211Q.

Beginning graduate microeconomics covering consumer and producer theory, price determination, economic efficiency, and welfare analysis.

**5202. Macroeconomics**

Three credits. Not open for credit to students who have passed ECON 2212Q.

Survey of the field: its historical foundations and development, conceptual framework, and application to current macroeconomic problems.

**5301. Mathematical Economics**

Three credits.

Use of mathematical concepts such as matrix algebra, optimization, and comparative statics, to study economic problems.

**5311. Applied Econometrics I**

Three credits.

Statistical theory and linear regression applied to business and economic problems.

**5312. Applied Econometrics II**

Three credits. Prerequisite: ECON 5311.

**5314. Causal Program Evaluation**

(Also offered as PP 5314.) Three credits.

Survey of the statistical methods and tools commonly used to evaluate causal claims about the impact of public policies and programs. This course is a required Master of Public Policy course.

**5315. Financial Econometrics**

Three credits. May be taught with ECON 3315.

Introduction to the mathematics of finance. Theoretical reasoning (proofs), modeling, useful simplifying approximations, and computing. Students will write basic programs in R.

**5326. Operations Research for Economics**

Three credits.

Use of mathematical programming for optimization of input-output mixes, of delivery routes, of communication networks and for performance evaluation based on economic theory of producer behavior.

**5348. Economic Development Policy**

Three credits.

The role of government in the economic development of underdeveloped countries. Topics include alternative paradigms of development and the resulting place for government in the economy; the theory, institutions, and policies of government

in planning, fiscal, and monetary concerns; analysis of policy instruments influencing international trade and financial flows; and the influence of international organizations on the development process.

#### **5421. International Trade: Theory and Policy**

Three credits.

The economic aspects of international relations, including the pure theory of international trade and the instruments of commercial policy. Topics include comparative advantage; international economic policies; and regional economic integration.

#### **5441. The Labor Market**

Three credits.

A thorough examination of the labor market. Topics include human capital, wage determination, public policy, and money wage rates.

#### **5461. Industrial Organization**

Three credits.

Survey of contemporary theory and models of the organization of industry. Topics include oligopoly; product differentiation; advertising; innovation; contestable markets; the financial theory of the firm; dynamic and evolutionary models; and transaction-cost economics.

#### **5463. The Economics of Organization**

Three credits.

Surveys the modern agency, transaction-cost, and evolutionary theories of organization. Topics include measurement and monitoring costs, asset specificity, incomplete-contracts theory, the dynamic capabilities approach, and alternative organizations.

#### **5473. Economic Development**

Three credits.

An examination of the problems facing the less developed nations. Comparisons of alternative paradigms of economic development (orthodox to political economy) and the strategies and policies they imply.

#### **5474. Seminar in Development and Growth**

Three credits.

A continuation of ECON 5473. Topics include agriculture and industry in development, investment criteria, essentials of developing planning, the promotion of domestic saving and fixed investment, foreign aid, improvements in international trade, and human capital formation.

#### **5495. Topics in Economics**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

#### **5499. Independent Study in Economics**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

#### **5500. Writing in Economics**

One credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Techniques for, and practice in, research, writing, citation, and data presentation in economics.

#### **6110. History of Economic Thought**

Three credits.

Advanced treatment of the history and methodological underpinnings of economic ideas from ancient times to the present. Particular attention to Smith, Marx, Marshall, and Keynes.

#### **6201. Microeconomic Theory I**

Three credits. Prerequisite: ECON 5201 or ARE 5201.

Neoclassical consumer and producer theory, choice under uncertainty, competitive and monopoly markets, and an introduction to general equilibrium.

#### **6202. Macroeconomic Theory I**

Three credits. Prerequisite: ECON 5202.

A rigorous course in dynamic general equilibrium models. Emphasis on analytical techniques and numerical solution methods.

#### **6211. Microeconomic Theory II**

Three credits. Prerequisite: A grade of B- or better in ECON 6201.

Game theory, information, and related topics.

#### **6212. Macroeconomic Theory II**

Three credits. Prerequisite: A grade of B- or better in ECON 6202.

Stochastic modeling, recent developments in the literature, and policy applications. Topics may include real business cycle theory, new classical economics, neo-Keynesian theory and growth models.

#### **6301. Advanced Mathematical Economics I**

Three credits.

An introduction to advanced mathematical topics with applications to economics. Topics and applications may include set theory, logic, topology, difference and differential equations, game theory, preference theory and matching models.

#### **6302. Advanced Mathematical Economics II**

Three credits. Prerequisite: A grade of B- or better in ECON 6301.

Topics and applications may include: dynamic programming, fixed-point theorems, measure theory, Markov chains and processes, functional analysis, and advanced optimization.

#### **6310. Econometrics I**

Three credits. Prerequisite: Open only to Economics graduate students.

First advanced course in econometrics methods used in economics. Properties of classical linear regression. Statistical theories that underpin econometric methods.

#### **6311. Econometrics II**

Three credits. Prerequisite: ECON 6310.

Large sample linear regression, time series analysis, maximum likelihood, GMM, and qualitative choice models.

#### **6312. Econometrics III**

Three credits. Prerequisite: A grade of B- or better in ECON 6311.

Special topics from recent advances in econometrics.

#### **6400. Independent Study**

Variable (1-3) credits. May be repeated for a maximum of nine credits.

Students pursue an in-depth study of an area of interest under the guidance of a faculty member.

#### **6411. Advanced Macroeconomics I**

Three credits. Prerequisite: ECON 6212.

Advanced treatment of material covered in ECON 6202 and ECON 6212.

#### **6412. Advanced Macroeconomics II**

Three credits. Prerequisite: ECON 6411.

Advanced treatment of material covered in ECON 6202 and ECON 6212.

#### **6441. Advanced Labor Economics I**

Three credits. Prerequisite: ECON 6211.

Labor supply with an emphasis on the family. Applications in the area of demography, development, and health.

#### **6442. Advanced Labor Economics II**

Three credits. Prerequisite: ECON 6211.

Labor demand and other applied topics in labor economics.

#### **6461. Industrial Organization**

Three credits. Prerequisite: ECON 6211.

Advanced treatment of the behavior and performance of firms in imperfectly competitive markets. Topics include the theory of the firm and costly contracting; information and strategic behavior; and product differentiation.

#### **6462. The Organization of Industry**

Three credits. Prerequisite: ECON 6211.

Advanced treatment of the behavior and performance of firms in imperfectly competitive markets. Topics include advertising, industrial R&D, and two-sided markets.

#### **6463. Economics of Organization**

Three credits.

Advanced treatment of material covered in ECON 5463.

#### **6466. Environmental Economics**

Three credits. Prerequisite: ECON 5201 or ARE 5201.

Economic analysis of environmental problems and corrective policy instruments. Topics covered will include the theory of externalities and public goods, the role of uncertainty and imperfect information in policy design, benefit-cost analysis, and non-market valuation. Applications to various environmental problems (such as air and water pollution, hazardous waste, and occupational health and safety) will be discussed.

#### **6473. Economic Development: Microeconomic Issues**

Three credits.

Overview of current literature on microeconomics of development, including human capital, internal structure of households, functioning of factor markets, and the role of institutions in mediating change.

#### **6494. Graduate Seminar**

One credit. May be repeated for a maximum of eight credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Participation in departmental research seminars and presentation and discussion of original research projects.

#### **6498. Variable Topics**

Three credits. May be repeated for credit.

## Education Curriculum and Instruction (EDCI)

### 5004. History of Educational Thought

Three credits.

Leading educational ideas and how these ideas influence theory and professional practice. The contributions of key individuals in the ancient, medieval and modern worlds are the basis for course organization.

### 5006. Comparative and International Education

Three credits.

Education and educational systems in comparative and international perspective, with emphasis on the interaction of educational institutions with other social, cultural and political institutions in society.

### 5008. Philosophical Analysis in Education

Three credits.

Introduction to philosophical analysis of significant educational concepts.

### 5040. Popular Music and Informal Education

Three credits. Prerequisite: Open only to Music Education M.A. students, others with consent.

Exploration of how popular music intersects with education, including the production and consumption of popular music and use of related informal pedagogies. Critical theory, cultural theory, feminism, and race studies will be used to explore these issues. Methods in "popular music" instruments and technology will also be covered.

### 5041. Theoretical Foundations of Music Education

Three credits. Prerequisite: Open only to Music Education M.A. students, others with consent.

Considers issues including music education programs, practices, curricula, and policies. Objectives for the course are to: (a) develop professional rationales for broadly used music education practices that involve information derived from relevant research in history, sociology, and philosophy, and critical theory; (b) analyze and critique selected music education programs, practices, curricula, and policies; (c) write a paper that reviews and critiques a broad area of practice in music education and recommends policy alternatives.

### 5047. Music Across the Curriculum

Three credits. Prerequisite: Open only to Music Education M.A. students, others with consent.

Strategies and theories for the integration of music experiences across the curriculum.

### 5050. TCPCG Seminar I: Student Teaching Seminar

Three credits. Prerequisite: Open only to students enrolled in the Teacher Certification Program for College Graduates; department consent required.

Analysis of instructional practice in the clinical setting. Relationship of instruction to theory, and implications for instructional evaluation, are emphasized.

### 5055. TCPCG Seminar II: Teacher as Professional

Three credits. Prerequisite: Open only to students enrolled in the Teacher Certification Program for College Graduates; department consent required.

Culminating seminar experience in the TCPCG program.

### 5060. Social and Multicultural Foundations of Education

Three credits. Prerequisite: Open only to students enrolled in the Teacher Certification Program for College Graduates; department consent required.

An introduction to the social and multicultural foundations of contemporary public education in U.S. society. Includes discussion of the nature, organization and purposes of public education in a democratic society, cultural diversity in U.S. schools and society, the role of the classroom teacher, professional ethics, and contemporary issues in U.S. education.

### 5065. Learning Theories

Three credits. Prerequisite: Open only to students enrolled in the Teacher Certification Program for College Graduates; department consent required.

Introduction to learning theories as they are applied to educational contexts. Topics include instructional objectives, behavioral analysis, social cognitive theory, cognitive psychology, social emotional development, and cognitive development.

### 5070. Methods of Instruction and Evaluation

Three credits. Prerequisite: Open only to students enrolled in the Teacher Certification Program for College Graduates; department consent required.

Selection and organization of learning experiences, instructional activities and materials, and methods of instruction. Course activities include a combination of lecture and seminar experiences.

### 5080. Reading and Literacy in the Content Areas

Three credits. Prerequisite: Open only to students enrolled in the Teacher Certification Program for College Graduates; department consent required.

Effective use of reading and writing to help students learning content material. Includes selection of reading materials that are appropriate for individual students with diverse reading abilities, understanding reading diagnosis provided by other professionals, using reading material in ways that facilitate comprehension and learning, and using written assignments to increase understanding and recall.

### 5085. Subject Area Methods

Three credits. Prerequisite: Open only to students enrolled in the Teacher Certification Program for College Graduates; department consent required. May be repeated for credit.

Selection and organization of learning experiences, instructional activities and materials, and methods of instruction related to the subject area. Course activities include a combination of lecture and seminar experiences, as well as extensive practice teaching.

### 5090. TCPCG Directed Student Teaching

Nine credits. Prerequisite: Open only to students enrolled in the Teacher Certification Program for College Graduates; department consent required.

Supervised student teaching in a subject-specific content area.

### 5092. Practicum

Variable (1-6) credits. Prerequisite: Open to M.S. students in Curriculum and Instruction, Special

Education, or the Educational Psychology concentration in Special Education. May be repeated for credit.

The implementation and application of theory in the student's area of specialization. Open primarily to master's and Sixth-Year students.

### 5093. Advanced Practicum

Variable (1-6) credits.

The implementation and application of theory in the student's area of specialization. Open primarily to master's and Sixth-Year students.

### 5094. Seminar

Variable (1-3) credits. May be repeated for a maximum of six credits.

Analysis of the issues and research in the field of education. Open primarily to master's and Sixth-Year students.

### 5095. Advanced Seminar

Variable (1-6) credits.

Analysis of the issues and research in the field of education. Open primarily to master's and Sixth-Year students.

### 5099. Independent Study in Education

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

Students requesting this course should have a significant background in education and should present to the instructor problems, well-defined and well laid out for investigation, which hold special interest for them and which will be pursued on the plan of advanced study.

### 5100. Teaching Reading and Writing in the Primary Grades

Three credits.

Processing unique to beginning reading and writing with emphasis on emerging literacy and promoting literacy development.

### 5105. Teaching the Language Arts

Three credits.

Teaching integrated language arts including oral and written communication, creative language, and spelling development with an emphasis on current research.

### 5110. Teaching Writing

Three credits.

A course for K-12 teachers with emphasis on teaching the writing process in persuasive, narrative and expository writing; evaluation of errors; developing appropriate curricular sequences; and research in the writing process.

### 5115. The Teaching of Reading

Three credits.

An overview of process and program; theoretical models of the reading, guidelines for a total school reading program, definition of terminology and principles of instruction. Analysis of available material made when appropriate. Intended as a background course for teachers with no previous course work or experience in teaching reading.

### 5120. Introductory Reading Clinic

Three credits.

Clinical practice in instruction of persons with corrective reading disabilities.

### 5125. Teaching Reading and Writing in Middle and Junior High School

Three credits.

Process and problems unique to reading and writing needs in the middle and junior high school. Emphasis on the development of reading and writing strategies as well as diagnostic teaching methods appropriate to this level.

### **5130. Teaching Children's Literature in the Elementary School**

Three credits.

Literature for elementary school children, techniques for developing interest in independent and recreational reading.

### **5135. Literacy in the Secondary School**

Three credits.

Process and problems unique to literacy needs in the secondary school. Emphasis on differentiated instruction for students with diverse backgrounds and abilities.

### **5140. Content Area Reading and Disciplinary Literacy**

Three credits.

The purpose of this course is to explore and develop teaching strategies, practices and classroom routines that are supportive of both literacy development and disciplinary learning. Current research in disciplinary literacy (DL) will provide a frame for discussing these topics. DL as an approach to content-area teaching is still emerging and we will use this course as an opportunity to learn about best practices associated with content-area learning while also exploring ways to make that learning more authentic to the disciplines they represent and more meaningful to adolescents.

### **5145. Classroom Assessment and Correction of Reading Difficulties**

Three credits.

Types of reading difficulties and the remediation methods appropriate for use by the classroom teacher.

### **5150. Clinical Diagnosis and Correction of Reading Difficulties**

Three credits.

Severe reading disabilities and clinical methods of remediation utilizing the case study approach.

### **5155. Advanced Reading/Language Arts Clinic**

Six credits. Prerequisite: EDCI 5150; instructor consent required.

For prospective reading/language arts specialists. A laboratory course in planning and implementing remedial reading/language arts instruction for persons with severe or complex reading and writing disabilities.

### **5160. Design, Management, and Supervision of Reading Programs**

Three credits. Prerequisite: EDCI 5150 and 5155; instructor consent required.

Designing, supervising and evaluating reading programs on a school and system-wide basis.

### **5165. Introduction to Deaf Education**

Three credits.

In this course we will explore current issues and approaches to teaching deaf and hard of hearing students by examining historical trends and current research in deaf education, language policy, deaf culture, speech and hearing development, and deaf studies.

### **5170. Literacy and Deafness**

Three credits.

In this course, we will explore current issues and approaches to teaching reading and writing to deaf and hard of hearing students, and examine current research on literacy and deafness drawn from a range of relevant perspectives.

### **5250. Teaching Literature to Adolescents**

Three credits.

A study of competing theories of literary response with an emphasis on implications for the teaching of literature and research on the teaching of literature. Includes some reading of literature for young adults.

### **5255. Teaching Composition (7-12)**

Three credits.

A study of composition theory, with an emphasis on implications for the teaching of writing and research on the teaching of writing.

### **5350. Teaching Elementary and Middle School Social Studies**

Three credits.

A study of curriculum alternatives, techniques of individual and small-group instruction, evaluation and the development of teaching materials.

### **5355. Trends in Social Studies Curricula**

Three credits.

New curricula and developments. For teachers and supervisors of social studies.

### **5360. Education and Popular Culture**

Three credits. Prerequisite: Instructor consent.

This course examines important and timely issues around popular culture and education with a focus on film, television, music, and students and teachers. The class will explore popular culture images of students and teachers and how these influence societal views of teaching and learning, analyze classroom practices with popular culture and develop skills and understanding applicable to teaching, study the history of film and television, and investigate issues of media literacy both in and out of the classroom.

### **5369. The Teaching and Learning of Mathematical Problem Solving**

Three credits.

Focuses on the processes involved in mathematical thinking and mathematical problem solving. Classroom discussions will address those aspects associated with expert problem solving-domain knowledge, problem solving skills, metacognition (belief and issues of control), and aesthetic judgements. Students will have an opportunity to discuss and solve various types of mathematics problems and develop instructional strategies to teach and assess mathematical problem solving at the middle and secondary school levels.

### **5450. The Teaching and Learning of Mathematics in the Secondary School**

Three credits.

Examination of current approaches to the teaching and learning of mathematics in the secondary school. Emphasis will be placed on issues surrounding content knowledge, curriculum, pedagogy, epistemology, assessment, and technology with respect to recent national initiatives and instructional techniques impacting on the secondary school mathematics curriculum.

### **5455. Curricula in Mathematics Education**

Three credits.

Exploration of significant curricula in mathematics education for teachers and supervisors of mathematics. Emphasis is placed on research and development related to content and techniques.

### **5460. The Teaching and Learning of Mathematics in the Elementary School**

Three credits.

Investigates the teaching and learning of mathematics in the elementary school. Emphasis will be placed on issues surrounding content knowledge, curriculum, pedagogy, epistemology, assessment, and technology with respect to national initiatives and instructional techniques impacting elementary school mathematics.

### **5465. The Teaching and Learning of Mathematics in the Middle School**

Three credits.

Investigates the teaching and learning of mathematics in the middle school. Emphasis will be placed on issues surrounding content knowledge, curriculum, pedagogy, epistemology, assessment, and technology with respect to national initiatives and instructional techniques impacting middle school mathematics.

### **5500. Teaching Science in the Middle and Secondary School**

Three credits.

Materials and advanced methods in the teaching of science in grades 7-12.

### **5505. Materials and Methods in the Teaching of Elementary School Science**

Three credits.

A systematic examination of major science and curriculum program for the elementary school, the selection and design of materials, the development of teaching techniques.

### **5550. Problems in the Teaching of Science**

Three credits.

Theories of teaching science with emphasis on studies of research related to current problems.

### **5555. Environmental Education**

Three credits.

Exploration of state, national, and international environmental issues and instructional approaches for developing student awareness, knowledge, and concern for the environment, K-12. Includes classroom and field study.

### **5700. Foundations of Bilingual Education**

Three credits.

Study of the political, social and legal aspects of bilingual education, including principles of second language acquisition.

### **5705. Curricular Issues in Bilingual Education**

Three credits.

Current approaches, methods and techniques with respect to curricular issues in contemporary bilingual education programs.

### **5715. Bilingualism and Second Language Acquisition**

Three credits.

Developmental sequences and theories of first and second language acquisition.

### **5720. Bilingual Education and Biliteracy**

Three credits.

Current methods, strategies and techniques of reading in the mother tongue (L1); transfer of reading skills into English (L2); and, evaluation and adaptation of L1 and L2 reading materials. Principles of second language acquisition.

#### **5740. Latinos and U.S. Education**

Three credits.

Conditions of schooling Latinos in the U.S. educational system via an historical and economic context, including principles of second language acquisition. Policy issues and theoretical discussions of underachievement. Relationship between dominant and subordinate cultures and their effect on classroom discourses.

#### **5742. Sheltered English Instruction for English Language Learners**

Three credits.

Current approaches and techniques with respect to academic language development in sheltered environments. This course attempts to disclose the most important issues surrounding content area teaching for English Language Learners (ELLs). Special attention is placed on the teaching of mathematics, science, and literacy in English for second language learners, including second language acquisition and development within the content areas.

#### **5750. Language Diversity and Literacy**

Three credits.

Overview of issues and debates concerning the theory and practice of literacy development for non-native English speaking students in the United States. Includes principles of second language acquisition.

#### **5755. Teaching English as a Second Language**

Three credits.

Examination of current research on the acquisition and learning of English as a second language (ESL) in school settings. Critical issues in the application of research on ESL to the bilingual classroom are discussed.

#### **5765. Assessment of Bilingualism**

Three credits.

Principles of assessment for bilingual learners, including language proficiency and dominance, (bi) literacy development, and academic content knowledge. Current assessment approaches for bilingual learners in different context (e.g., bilingual, ESL classes) and for various purposes (e.g., screening, placement, evaluation). Principles of second language acquisition.

#### **5802. Lectures in Education**

One credit.

A course in which staff members and authorities in education and related fields discuss selected problems.

#### **5804. Curriculum Planning**

Three credits.

Examines teachers' issues and problems from real-life cases with theoretical perspectives and pedagogical methods.

#### **5810. Workshop in Education**

Variable (1-3) credits. May be repeated for a maximum of nine credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Professional personnel to work cooperatively on problems arising out of actual school situations.

#### **5820. Media Literacy in an Information Age**

Three credits.

Study of the growing field of media literacy and the media's influence upon our culture and education. Includes major principles, development of media analysis skills, and integration with the school curriculum.

#### **5825. Enhancing Classroom Curriculum with Computers and Electronic Media**

Three credits.

Effective use of microcomputers and other electronic media to strengthen and enhance classroom instruction in the basic content and skill areas. Emphasis upon specific curriculum applications of technology rather than on its basic operation, mechanics, and programming.

#### **5830. Curriculum Laboratory**

Variable (1-6) credits. May be repeated for a maximum of nine credits.

Open to teachers and administrators seeking practical solutions to curriculum problems in elementary and secondary schools. Reorganization of courses, reorientation of the program of studies, articulation of administrative units, and development of new materials are considered in relation to the local situation. Students make individual studies of their specific problems, and group studies of related problems.

#### **5845. Seminar in International Education**

Three credits.

Concentrated study of culture and education in a major geographical region such as Africa, Asia, or Latin America; or cross-cultural studies of educational issues.

#### **5850. Introduction to Curriculum**

Three credits.

Philosophy, theory, and practice employed in curriculum development and change.

#### **5875. Multicultural Education**

Three credits.

Interrelationships between education and various sociocultural aspects of cultural diversity and cultural pluralism, including language acquisition and diversity.

#### **5885. Introduction to Critical Pedagogy**

Three credits.

Theory and practice in teaching for social justice with an emphasis on issues of class, race, gender and ethnicity.

#### **5890. Educational Linguistics**

Three credits.

Overview of the study of language and linguistics, and especially applied linguistics, with emphasis on their implications for classroom teacher. Includes principles of second language acquisition.

#### **5895. Language Ideology and Education**

Three credits.

Interrelationship among language, ideology, education and society, including examination of issues of social classes, ethnicity, gender, social context, power, and politics. Also covered are literacy, language prescriptivism and standardization, language policy and discourse in

critical perspective. Principles of second language acquisition.

#### **6000. Qualitative Methods of Educational Research**

Three credits.

Purposes and nature of qualitative research, including selected techniques for conducting various types of qualitative and naturalistic research in educational settings.

#### **6005. Advanced Methods of Qualitative Research**

Three credits.

Field-based methods of collecting data in qualitative research studies in educational settings, coding and analysis of qualitative data, use of computer programs to analyze data, and methods and procedures for ensuring trustworthiness in qualitative research.

#### **6010. Writing for Educational Publications**

Three credits.

Designing, writing, editing, and marketing material for professional publication.

#### **6092. Practicum**

Variable (1-6) credits.

The implementation and application of theory in the student's area of specialization.

#### **6094. Seminar**

Variable (1-6) credits. May be repeated for a maximum of nine credits.

Cooperative study of developments and problems in the student's area of specialization.

#### **6200. Theoretical Foundations of Teaching English**

Three credits.

A sociocognitive perspective on teaching the English language arts, including the historical, sociological, linguistic, and psychological foundations of teaching English.

#### **6410. Learning Theories for Mathematics Instruction**

Three credits. Prerequisite: EPSY 5510.

Examines various learning theories and their influence on mathematics instruction. In particular, understanding the processes involved in mathematical thinking, the impact of learning theory on mathematics instruction, expert-novice models of mathematical behavior, and ways to enhance mathematics learning in the classroom.

#### **6415. Research in Mathematics Education**

Three credits.

Analysis of research in mathematics education, methods of research, and design and research studies.

#### **6500. Research in Science Education**

Three credits.

An analysis of current research in science education. Emphasis on evaluation of research as well as the design and implementation of research.

#### **6860. Research in Multicultural Education**

Three credits.

Advanced study in the processes and findings of research in multicultural education.

## Educational Leadership (EDLR)

### 5015. Teacher Leadership and Organizations

Three credits.

Teachers' role in providing leadership that extends beyond the walls of the individual classroom and includes collaboration with other adults.

### 5085. Capstone Project in Sport Management

Variable (1-6) credits. Prerequisite: Open only to Kinesiology M.A. students in the Sport Management concentration who have completed all coursework toward the degree and are in the final semester; instructor consent required.

Students develop and present a semester-long research project in an area of sport management.

### 5091. Internship

Six credits. May be repeated for credit.

The application and implementation in a work situation of theories and practices related to the student's area of specialization.

### 5092. Practicum: Administrative Field Experience

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

Provides an opportunity for educators who wish to become administrators of educational organizations to become familiar with the functions and tasks that certified administrators perform. Intended primarily for Sixth-Year students.

### 5094. Seminar

Three credits. May be repeated for a maximum of 12 credits.

Analysis of the issues and research in the field of education. Open primarily to Master's and Sixth-Year students.

### 5099. Independent Study in Education

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

Students requesting this course should have a significant background in education and should present to the instructor problems, well-defined and well laid out for investigation, which hold special interest for them and which will be pursued on the plan of advanced study.

### 5102. Assessment, Evaluation, and Research in Student Affairs I

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

The role of assessment and evaluation to address current student affairs issues in higher education settings. Focus on skill development in problem identification, research question formulation, qualitative design, interview protocol development, and critique and applications of professional literature.

### 5103. Assessment, Evaluation, and Research in Student Affairs II

Three credits. Prerequisite: EDLR 5102; open only to Higher Education and Student Affairs M.A. students; instructor consent required.

Application of assessment and evaluation research methodologies to address genuine problems in student affairs contexts. Focus on

development of theoretical framework, quantitative methods, reporting results, and formulating recommendations for improving practice and policy.

### 5105. Structured Group Dialogue in Student Affairs

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

Explore basic approaches to structured intergroup and intragroup dynamics and implications for personal and educational development of students and student affairs professionals.

### 5107. Resource Management in Student Affairs Administration

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

Analysis of higher education resource development and management with an emphasis on issues in student affairs administration; including, financial management and analysis, human resource management, and management of information technology resources.

### 5108. Leadership Challenges in Higher Education

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

Application of leadership theory to challenges faced by higher education professionals. By developing critical thinking and problem solving skills, students will learn to identify a crisis, provide leadership for crisis management, and utilize methods of managing communication regarding incidents.

### 5113. College and University Environments

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

Seminar designed to explore various institutional types, missions, and cultures including private liberal arts colleges, community colleges, comprehensive, research-extensive and special purpose universities. Primary emphasis is on the effect of institutional structure on higher education and student affairs administration.

### 5114. Access to Higher Education

Three credits.

Provides students with an opportunity to examine and discuss research on individual, institutional, and political factors that are known to impact participation in higher education. Particular attention is given to stratification in higher education including but not limited to the historical and legal context of access; points of access; pathways to higher education; state and federal policies; and college affordability. In addition to learning and discussing various topics related to college access, students in the course will engage in indirect or direct service around college access in the local community.

### 5117. The College Student

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students.

Characteristics of today's college students. Student behavior theory. Impact of college on students.

### 5118. Seminar in Higher Education

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students.

Seminar designed to promote the integration of the core curriculum and practitioner experiences of the Master's degree program in Higher Education and Student Affairs and to prepare students for transition to professional positions within student affairs upon graduation.

### 5119. The Law, Ethics, and Decision-making in Student Affairs

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students.

Survey of case law and statutory provisions related to higher education with a focus on student affairs administration. Students will develop an understanding of ethical decision-making and its application to relevant student affairs scenarios.

### 5122. College Student Development: Programs and Services

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

History and philosophy of student personnel work related to contemporary and projected student developmental programs and services. Rights, freedoms and responsibilities of students in relation to the college.

### 5123. Administration of Student Affairs in Higher Education

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students.

Administration of student affairs and services and applications of student development theory in the college community.

### 5125. Issues in Student Affairs Administration

Three credits. Prerequisite: Open only to Professional Higher Education Administration students.

An examination of issues that affect the new student affairs administrator. Topics vary per semester.

### 5126. Leading Toward a Multicultural Educational Environment

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students.

American higher education continually struggles with issues of difference, particularly racial, ethnic, gender, ability, religion, sexual orientation, and other cultural differences. Course participants are challenged to reflect on their personal experiences and examine their values, beliefs, and attitudes with regard to multicultural difference as a means to deepen a critical understanding of multicultural issues in higher education.

### 5130. Teaching College Students through Transition

Three credits. Prerequisite: Instructor consent.

A practical and theoretical course that gives students the opportunity to explore academic literature of student transition while teaching a UNIV freshman year experience course for students transitioning into the University of Connecticut.

### 5201. Influences on Adult Learning

Three credits. Prerequisite: Instructor consent.

Interaction of person and environment. Culture. Role of environment. Situational barriers.

Motivation. Self-regulation. Personality. Gender. Life transitions. Self-directed learning.

### **5202. Workplace Learning**

Three credits.

Trends in workplace learning and workforce development. Conceptual models of performance improvement and transfer of training. Focus on individual, work team, and organizational variables related to learning, performance, and transfer of training.

### **5203. The Brain, Experience, and Adult Learning**

Three credits.

Four learning systems within the brain. Role of experience in learning. Implications for adult learning and professional development programs.

### **5204. Organizational Learning**

Three credits.

Group and collective learning in organizational settings, with an emphasis on adaptive and generative learning processes.

### **5205. Professional Development**

Three credits.

Using research on how adults learn best and principles of human resource development to implement effective, job-embedded professional development programs. Using professional development to advance organizational goals. Examination of best practices.

### **5206. Development of Programs for Adult and Human Resource Education**

Three credits. Prerequisite: Instructor consent.

Program development for adult learners; emphasis on collaborative planning, needs assessment, effective learning strategies, transfer of training, evaluation, principles of good practice.

### **5207. Methods for Facilitating Adult Learning**

Three credits. Recommended preparation: EDLR 5201.

Focuses on principles and practices of adult learning facilitation, including situational and methodological factors that impact how adults learn in conventional and multimedia contexts.

### **5300. Management of Sport Services**

Three credits.

Management processes and practices involved in operating sport organizations.

### **5302. Program Evaluation for School Improvement**

Three credits.

Program evaluation issues critical to effective school leadership.

### **5303. Supervision of Educational Organizations**

Three credits.

Supervision models; teacher selection and induction; teacher evaluation; staff development and organizational change.

### **5304. Curriculum Laboratory**

Variable (1-3) credits.

Open to teachers and administrators seeking practical solutions to curriculum problems in elementary and secondary schools. Reorganization of courses, reorientation of the program of studies, articulation of administrative units, and development of new materials are considered in relation to the local situation. Students make

individual studies of their specific problems, and group studies of related problems.

### **5305. Legal Aspects of Education**

Two credits.

Legal status of public schools; legal rights and responsibilities of administrators, parents, students, school board members, and teachers.

### **5306. School Leadership and Administration of Educational Organizations**

Three credits.

Introduces students to concepts and skills which are fundamental to the successful administration of educational organizations. Provides pragmatic knowledge which will give students an understanding and appreciation of the complexity of educational organizations. Uses Bolman and Deal's conceptual framework (multi-frame thinking) which borrows ideas from sociology, management science, psychology, political science as well as social and cultural anthropology.

### **5307. Contemporary Educational Policy Issues**

Three credits.

Study of current educational policy issues.

### **5308. Psychological Foundations of Education**

Three credits.

Learning and related psychological theories and their implications for curriculum, teaching methods, and other aspects of educational practices.

### **5310. Creating and Sustaining a Positive School Climate**

Three credits. Prerequisite: Department consent.

Gives aspiring school administrators practices and processes for establishing and sustaining a positive school climate for the purpose of improving student achievement. The aspiring school administrator will recognize the necessity of developing a clear vision for education and applying it when building a positive school culture.

### **5315. Sport in Society**

Three credits.

The structure and function of sport as an institution, including issues and controversies involving gender, race, and intercollegiate, professional, and children's sports.

### **5325. Legal Aspects of Sport**

Three credits.

Tort law principles specific to sport, fitness and recreational activities.

### **5355. Seminar in Change and Innovation in Education**

Three credits.

Innovation has been widely acknowledged as a driving force in all areas of human activity. The need for innovation in business receives much of this attention, but the need for creative solutions to vexing problems has also been noted in human services, such as education, social welfare, etc. Introduces current and future educational leaders to the ways in which creativity and change leadership can help them promote real, lasting change in their work.

### **5360. Leadership in Sport Organizations**

Three credits.

Examines multiple perspectives of leadership, from original theories of leadership through to the most contemporary forms of collaborative and

team-based leadership. Examines the personal, interpersonal, and team-based skills that are required in leadership roles. Explores the practice of effective leadership, understanding how leadership roles require different skills during times of change or crisis, and in different contexts (intercollegiate, professional, sport for development, etc.).

### **5365. Managing Diversity in Sport Organizations**

Three credits.

Managing sport as a social and cultural phenomenon. Using management theories, sociological concepts and critical thinking to investigate such issues as: how sport impacts our ideas about masculinity, femininity, sexual orientation, class inequality, race and ethnicity, dis/ability, achievement, competition, and individualism; how the organization and management of sport is connected with social relations in groups and societies; and how sport extends beyond competitive outcomes and deals with issues of power and power relations in society.

### **5370. Ethical Leadership in Sport Organizations**

Three credits.

A broad understanding of ethics, ethical theory development and the importance and relevance of ethics to the sport management profession. Students will examine ethical frameworks as they relate to the sport industry, the environment, and the individual within a sport organization. Students will work to develop personal and professional codes of ethics and ethical leadership based on sound ethical theory, and apply critical thinking and ethical decision making skills to contemporary ethical and legal issues within the sport context.

### **5375. Strategic Human Resource Management in Sport Organizations**

Three credits.

Sport management is the coordination of several factors and the most significant of those factors is human resources. Students will understand that managing human resources requires more knowledge, time, and patience than managing any other resource. Students will examine the technical and legal aspects of human resource management from a strategic sport business perspective. They will learn from faculty and industry professionals on how to direct a sport organization through decisions on staffing patterns and responsibilities, evaluation of and rewards for performance, and establishing a fair and just work environment. Emphasis on how to integrate human resource management into overall strategy in a sport organization.

### **5380. Sport Marketing**

Three credits.

Examines the application of marketing principles to collegiate and professional sport, event promotions, and commercial and public organizations.

### **5385. Sport Facility and Event Management**

Three credits.

Examines all aspects of the management of sport facilities and events, including development, planning, staffing, operations, and evaluation.

### **5518. Introduction to Sport Based Youth Development**

Four credits. Prerequisite: Instructor consent.

This is a service learning course that requires both classroom participation and community involvement.

**6001. Legal Issues in Student and Parent Rights**

Three credits.

Examines the legal issues that arise with respect to student and parent rights, such as search and seizure, student discipline, speech and religion, and homeless children.

**6002. Legal Issues in School Employment**

Three credits.

Examines the legal issues that arise with regards to employment in K-12 education, such as tenure, employment discrimination, due process, and collective bargaining.

**6004. Legal Issues in Educational Technology**

Three credits.

Examines the legal issues that arise with respect to special education in K-12 education, such as intellectual property, social media, cyberbullying, sexting and virtual schools.

**6050. Dissertation Proposal/Prospectus Development I**

Three credits. Prerequisite: Department consent.

Open to students enrolled in doctoral programs. Systematic development of dissertation proposal components, including introduction, problem statement, conceptual framework and/or review of literature, and research questions.

**6051. Dissertation Proposal/Prospectus Development II**

Three credits. Prerequisite: Department consent.

Open to students enrolled in doctoral programs. Systematic development of dissertation proposal components, including methodology, methods, procedures, limitations, all related appendices, IRB application, and proposal defense.

**6052. Qualitative Methods of Educational Research II**

Three credits. Prerequisite: EDCI 6000.

Companion to EDCI 6000. Provides the opportunity for students to more closely examine qualitative methodology and methods to ensure that students are able to synthesize an analysis of qualitative data. Specifically, students will generate credible units from narrative and visual data and develop categories from the units through comparing, contrasting, aggregating, and ordering data. Students will present findings in a chronological or thematic case example or case history, in an essay formulated around topics or theses, or in an alternative format appropriate to the analysis.

**6054. Inquiry and Research in Educational Leadership I: Foundations, Design, and Use**

Three credits. Prerequisite: Open only to Educational Leadership Ed.D. students.

Explicates knowledge production through systematic inquiry in education, including processes, questions, and strategies used to conduct meaningful research in schools. Explores the intersection of theory and practice with emphasis placed on the critical analysis and interpretation of the research literature to the practice of school leadership.

**6055. Inquiry and Research in Educational Leadership I: Implementation, Analysis, and Discovery**

Three credits. Prerequisite: Open only to Educational Leadership Ed.D. students.

A continuation of EDCI 6054. Elaborates the strategies and tools used to conduct meaningful research in schools with emphasis in the actual conduct of research in school settings. Explores the link between research findings and the improvement of practice.

**6092. Practicum**

Variable (1-9) credits. May be repeated for credit.

The implementation and application of theory in the student's area of specialization.

**6201. Strategic Applications of Adult Learning**

Three credits. Prerequisite: EDLR 5201, 5202, 5203, and 5204; open only to students in the Adult Learning graduate program; instructor consent required.

Case study analysis and live case study consultation to develop innovative approaches to adult learning to address the challenges of employee development in corporate, education, public sector, and private sector settings.

**6300. Organizational Theory in Sport**

Three credits. Prerequisite: Open only to doctoral students with instructor consent.

Exposes students to some critical areas of management and the theories associated with these areas.

**6301. School District Executive Leadership**

Three credits. May be repeated for a maximum of six credits.

Seminar and practicum experiences focusing on leadership and policy issues facing school superintendents, central office administrators, and senior state education agency officials.

**6302. School District Policy, Politics, and Governance**

Three credits. Prerequisite: Instructor consent.

Study of educational policy and school governance; the politics of educational administration; reform; finance; and the processes of district policy formulation, implementation, and analysis. Specific school district policy and governance issues are examined.

**6303. Data-Driven Decision Making for School Improvement and Policy Development**

Three credits. Prerequisite: Instructor consent.

Provides school leaders with the knowledge necessary to improve instructional programs and improve policy by relying on data-driven strategies and tools. The course meets in seminar/lab format with students working on data-driven problems, analyses and developing action plans as a result. Students work on several case studies and a major project of personal, professional significance.

**6304. Financial and Human Resources Management in Education**

Three credits. Prerequisite: Instructor consent.

Study of human resources development practices in school systems, with emphases on central office and school unit responsibilities for attracting, selecting, developing, evaluating, and retaining competent faculty and staff. This course also includes the study of concepts in school finance and school business management. Attention is

given to national, state, and local issues. Emphasis is also given to school support services including transportation, faculty planning and maintenance, food service, and risk management.

**6310. Organizational Behavior in Sport**

Three credits. Prerequisite: Open only to doctoral students with instructor consent.

A discourse on theories related to behavior of individuals and groups in sport and exercise organizations.

**6312. Leadership for Teaching and Learning: The Role of the Leader in School Improvement**

Three credits.

Explores leadership skills required to improve instruction and student learning in the school and district. Students develop and apply models to address an instruction/achievement issue in practice.

**6313. Educational Policy and Politics**

Three credits.

Study of educational policy; the politics of educational administration; and the processes of policy formulation, implementation and analysis. Specific educational policy areas are examined.

**6314. Legal Issues in Organizational Management**

Three credits. Prerequisite: Open only to Educational Leadership Ed.D. students.

The legal process and understanding of legal issues in education involving students, teachers, and boards of education.

**6315. Current Research in Sport Management**

Three credits. Prerequisite: Open only to doctoral students with instructor consent.

Research in the field of sport management. Each week one or more researchers will present their completed work, studies in progress, or proposed research.

**6322. Economics of Education Reform**

(Also offered as PP 5337.) Three credits. Prerequisite: Instructor consent.

Examines a number of prominent education reform strategies, using economics as a lens through which to understand the motivations for and potential impacts of each. Economics enables us to focus on the incentives created by these policies, allowing us to predict their intended and unintended consequences. We will utilize this framework throughout the course as we read about and evaluate the effectiveness of various educational interventions and policy reforms. Topics include (among others): class size reduction, teacher quality and teacher certification, merit pay, school accountability, school choice, school finance reform, early childhood education, and topics in higher education.

**6323. Seminar in the History of K-12 Education Reforms, 1890-present**

Three credits. Prerequisite: Instructor consent.

Seminar examining the history of K-12 education reforms from the 1890s to the present day.

**6464. Seminar: Leadership and School Organizations**

Three credits.

Study of organizations and leadership from the perspective of the humanities and the social and behavioral sciences.

#### **6465. Educational Administration Issues and Research**

Three credits. Prerequisite: EPSY 5605, 5607, and 6601. May be repeated once for credit.

Designing educational research studies; current topics in school administration. Ordinarily meets for 10 full days for special research activities.

#### **6466. Policies for Improvement: Mobilizing School and Community**

Three credits.

Advanced seminar explores perspectives on the policy environment for school improvement. Students identify policy issues, collect data, conduct analyses, and propose actions.

#### **6467. Social Justice Leadership, Equity and School Change**

Three credits.

Exploration of various tenets, theoretical tensions, and transformative applications of social justice leadership in American education.

### **Educational Psychology (EPSY)**

#### **5092. Practicum**

Variable (1-6) credits. Prerequisite: Open to master's and Sixth-Year students. May be repeated for credit.

The implementation and application of theory in the student's area of specialization.

#### **5094. Capstone in Secondary Transition**

Three credits. Prerequisite: Instructor consent required.

Serves as a capstone for the Transition to Adulthood graduate certificate. Provides students the opportunity to independently design and complete activities to demonstrate specific transition competencies through the creation of a portfolio. This project has been designed as a vehicle for ensuring that all students in this certificate program have mastered the teaching and administrative competencies necessary for implementing a successful secondary transition program for individuals with disabilities.

#### **5108. Students with Special Needs in the Classroom Environment**

Three credits.

Methods for identifying, planning for, and working effectively with children with special needs in the general education classroom. Intended for non-SPED majors only.

#### **5113. Beginning Reading Supports for Students with Learning Difficulties**

Three credits. May be repeated for a maximum of six credits.

Provides graduate level students with knowledge and skills related to supporting early reading success for students with disabilities and at risk for experiencing learning difficulties.

#### **5114. Adolescent Reading Supports for Students with Learning Difficulties**

Three credits. May be repeated for a maximum of six credits.

Research-based instructional interventions and infrastructure supports (e.g., SRBI, RtI) necessary

to improve reading comprehension outcomes for struggling adolescent readers including students with high-incidence disabilities.

#### **5115. Writing Supports for Students with Learning Difficulties**

Three credits. May be repeated for a maximum of six credits.

Writing instruction and assessment designed to support K-12 students who are at-risk for or experiencing learning difficulties or disabilities, with an emphasis on incorporating evidence-based methods into a rich, engaging, and meaningful writing curriculum.

#### **5116. Assessment in Special Education**

Three credits.

Application of assessment in special education focusing on current purposes, policies, and practices in schools.

#### **5119. Policy, Law, and Ethics in Special Education**

Three credits.

The impact of policy and law on the professional role of special educators.

#### **5121. Developmental Foundations of Exceptionality**

Three credits.

An exploration of the link between normative theory and research in child development with assessment, understanding, and intervention for children and youth with exceptionalities.

#### **5123. Instructional Strategies and Adaptations for Students with Special Learning Needs**

Three credits.

Principles and practices for the provision of effective instruction for students with special learning needs.

#### **5135. Creating and Sustaining a Positive School Climate**

Three credits. Prerequisite: Open only to students in the UConn Administrator Preparation Program; instructor consent required.

Designed to help aspiring school administrators develop practices and processes for establishing and sustaining a positive school climate for the purpose of improving student achievement.

#### **5140. Transition Planning for Students with Disabilities**

Three credits.

An examination of relevant legislation and recommended practices related to person-centered transition planning for students with disabilities in post-school and adult life, including postsecondary education, employment, community participation, and independent living.

#### **5141. Classroom and Behavior Management for Special Educators**

Three credits.

An introduction to Positive Behavior Interventions and Supports (PBIS), including theoretical and empirical support, three-tiered model, and implementation strategies.

#### **5142. Individualized Positive Behavior Support**

Three credits. Prerequisite: EPSY 3125 or 5141.

Approaches for adapting programs to the behavioral, social and emotional needs of exceptional learners.

#### **5145. Issues in Postsecondary Disability Services**

Three credits.

An examination of issues relating to the assurance of equal educational access for students with disabilities in postsecondary settings.

#### **5146. Advanced Topics in Secondary Transition**

Three credits.

An in-depth overview of the transition planning process. Highlights the importance of person-centered planning, encouraging self-determination, and involving individuals and families in the assessment and transition programming process.

#### **5161. Assistive Technology for Access**

Three credits. Prerequisite: EPSY 5160.

Introduction to alternate access to the computer as a tool for the performance of educational tasks. Exploration of alternate and adaptive pointing and keyboard devices as well as software to enhance accessibility and productivity for persons with motor impairment, sensory challenges, and cognitive difficulties. Assistive technology solutions and applications for persons with significant disabilities in the educational environment.

#### **5170. Family Centered Practices in Early Childhood Intervention**

Three credits. Prerequisite: Instructor consent.

Illustrates the centrality of the family in the life of infants and young children with disabilities and, subsequently, early childhood intervention. This course relies on outside readings, discussions, and completion of performance-based competencies where concepts are interpreted and applied to early childhood intervention.

#### **5171. Evaluation and Assessment of Infants and Young Children with Disabilities or Delayed Development**

Three credits. Prerequisite: Instructor consent.

Designed for students who are preparing to work with infants and young children who have disabilities (birth through age five) and their families. Focuses on five functions of assessment relative to young children with disabilities: identification and referral, evaluation to determine eligibility for special education, assessment for program planning, monitoring of individual child progress and program evaluation.

#### **5172. Intervention of Early Childhood Disabilities or Delayed Development and Their Families**

Three credits. Prerequisite: Instructor consent.

Illustrates the importance of well planned and executed interventions for infants and young children with high needs and/or disabilities who receive early childhood services under the Individuals with Disabilities Education Act (IDEA). Creation of intervention programs with integrated (across developmental domains) outcomes that stem from a functional assessment and a collaborative team process. This includes interventions and services designed to maximize natural learning opportunities and the use of evaluation tools and progress monitoring for individual children and families as required for federal reporting. Outside readings, class discussions, interactive web-based assignments and completion of performance-based competencies

where concepts are interpreted and applied to infants and young children and their families.

**5173. Teaching and Collaborating of Infants and Young Children with Disabilities and their Families**

Three credits. Prerequisite: Instructor consent.

Provides a foundation for the inclusion of infants and young children with disabilities and their families into inclusive community settings and programs. Inherent within this framework is the ability for personnel to demonstrate strategic planning to accomplish this on a family, community and program. Outside readings, in-class activities, and individual and group applications of competencies.

**5183. Lectures in Education**

One credit.

Staff members and authorities in education and related fields discuss selected problems.

**5188. School-based Practicum in Communication Disorders**

Six credits. Prerequisite: Open only to Communication Disorders M.A. students; instructor consent required.

100 clock hours of practicum in assessment, treatment, and prevention of communication disorders in children Pre-K-Grade 12.

**5194. Seminar**

Three credits. Prerequisite: Open to master's and Sixth-Year students. May be repeated for credit.

Analysis of the issues and research in the field of education.

**5195. Workshop in Education**

Variable (1-3) credits. May be repeated for credit.

Professional personnel to work cooperatively on problems arising out of actual school situations.

**5198. Curriculum Laboratory**

Variable (1-6) credits. May be repeated for credit.

Reorganization of courses, reorientation of the program of studies, articulation of administrative units, and development of new materials are considered in relation to the local situation. Students make individual studies of their specific problems, and group studies of related problems.

**5199. Independent Study in Education**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

Students requesting this course should have a significant background in education and should present to the instructor problems, well-defined and well laid out for investigation, which hold special interest for them and which will be pursued on the plane of advanced study.

**5215. Professional Seminar in Learning Technologies**

Three credits. Prerequisite: Open to cohort members in the Two-Summers Master's Program.

Professional issues in the wise integration of learning technologies to classroom instruction.

**5220. Introduction to Educational Technology**

Three credits.

Instructional applications of productivity software and educational technology.

**5221. Wise Integration of Technology into Teaching and Learning Environments**

Variable (1-3) credits. Prerequisite: Open only to students in the Integrated Bachelor's/Master's teacher preparation program. Recommended preparation: master's student status in the IB/M program.

Technology integration into classroom teaching for teacher preparation.

**5225. Learning Technology Applied in Schools**

Three credits. Prerequisite: Open only to students in the Two Summers program in Learning Technology.

Applied project work integrating technology into classroom instruction.

**5230. Web-Based Learning**

Three credits. Prerequisite: EPSY 5220, 5240, 5510, and 5520.

Design, development, delivery and evaluation of web-based instruction.

**5235. Design and Production of Multimedia Presentations**

Three credits.

Students will prepare presentations using slides, motion pictures, audiotapes and overhead transparencies; and will explore application of other technological developments to multimedia uses.

**5240. Interactive Learning Environments**

Three credits. Prerequisite: EPSY 5510 and 5220.

Broad overview of the interactive learning environments (ILEs) that are being used in Education. Introduces students to current research in development and implementation of ILEs.

**5245. Capstone Course in Learning Technologies**

Three credits. Prerequisite: Open only to students in the Two Summers program in Learning Technology.

E-Portfolio preparation, technology-based professional development design, and program completion artifacts.

**5301. Group Processes in Counseling**

Three credits.

Experiential and theoretical introduction to group process and dynamics.

**5304. Foundations and Contents of School Counseling**

Three credits.

Basic philosophical and professional premises of the counseling profession. History of counseling profession, counselor's roles and functions, role of research/theory in counseling, and professional ethics. Individual group, and preventive counseling approaches.

**5306. Principles of Career Development in Counseling**

Three credits.

Career development and career psychology. Adolescents and adults.

**5307. Professional Orientation of School Counseling**

Three credits.

Principles and practices of pupil personnel work in educational institutions including all aspects of pupil personnel services; the role of the school

counselor as a pupil personnel worker; and as a consultant on teacher-pupil relations.

**5308. Counseling: Theory and Practice**

Three credits. Prerequisite: EPSY 5307.

Contemporary theories and practices of essential helping skills.

**5309. Gender Role Conflict Issues for Helping Professionals**

Three credits.

Intensive review of gender role socialization in a workshop setting, emphasizing men's and women's gender role conflicts across the life span. Lectures, readings, discussions, self-assessments, and media are used to explicate core concepts and themes.

**5313. Multi-Cultural Parent-Professional Alliances**

Three credits.

Alliance-building processes between helping professionals and parents. Multi-cultural relationship development.

**5314. Appraisal Procedures in Counseling**

Three credits. Prerequisite: EPSY 5306 and 5602.

Use of instruments for estimating abilities, achievements, interest and personality; interpretation of appraisal procedures in counseling.

**5315. Counseling: Advanced Practice**

Three credits. Prerequisite: EPSY 5308 Instructor consent required.

Continuing the work begun in EPSY 5308; to strengthen and extend helping skills.

**5316. Cross-Cultural Counseling**

Three credits. Prerequisite: EPSY 5308 and 5315.

Theories, skills and practices of counseling with culturally different persons in mental health settings.

**5317. Field Work in Counseling and Personnel**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

Supervised experience in counseling and related practices in schools and agencies with a concurrent supervisory seminar.

**5318. Human Growth and Development over the Lifespan: Implications for Counselors**

Three credits. Prerequisite: Department consent.

A review of human growth and development over the lifespan using psychosocial theory with an emphasis on individual and family transitions, learning processes, personality, developmental crises, gender role conflicts and transitions, ethical issues, and strategies to optimize human potential.

**5319. School Counseling Internship**

Variable (3-6) credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

Post practicum experience in school counseling under the supervision of a fully trained and certified professional school counselor for the duration of one school year along with an accompanying on-campus seminar. All core courses in the school counseling program must be completed prior to beginning the internship.

**5320. Critical Issues in School Counseling**

Three credits. Prerequisite: Instructor consent.

An introduction to the broad profession of counseling; the ethical standards of the American

Counseling Association and the American School Counseling Association; and a review and analysis of the critical and emerging issues and incidents facing today's professional school counselors.

**5339. Assistive Technology for Curriculum Access**

Three credits.

Explores the range of assistive technology devices and software for curriculum access from the preschool through secondary environments.

**5396. Directed Student Teaching for Students in the Teacher Certification Program for College Graduates**

Nine credits. Prerequisite: open only to students enrolled in the Teacher Certification Program for College Graduates; instructor consent required.

Supervised student teaching in special education.

**5402. Individual Differences in Learners**

Three credits.

Foundations for individual differences among elementary and secondary school pupils.

**5403. Intellectual Assessment**

Three credits. Prerequisite or corequisite: EPSY 5602; open only to students in the School Psychology program; instructor consent required.

Administration of the standard instruments of intellectual assessment and synthesis of the test information into an assessment report.

**5404. Pupil Behavior: Studies in Clinical Diagnosis**

Three credits. Prerequisite: Instructor consent.

Diagnosis of school problems, report writing for school purposes, and analysis of needs for referral.

**5405. Applied Behavior Analysis**

Three credits.

Introduction to theories and application of behavioral techniques.

**5406. Consultation Theories and Practices**

Three credits.

Theories and practices of professional consultation with an emphasis on actual interventions in schools, corporations and social service agencies.

**5408. Ethics in Educational and Professional Psychology**

Three credits.

Explores the nature of professional virtue in psychology and related educational and human service disciplines.

**5420. Roles and Functions of School Psychologists**

Three credits.

The roles and functions of school psychologists, including the development of the specialty, delivery models, assessment, and interventions. Addresses the provision of comprehensive and integrated school psychological services as outlined by the National Association of School Psychologists and the health service provider specialty of professional psychology of the American Psychological Association.

**5425. Procedures in Academic Assessment**

Three credits.

Provide students with knowledge and skills related to conducting multi-method academic assessments (e.g., various norm-referenced and

criterion-referenced tests, curriculum-based assessment, direct observation, interviews, review of permanent products, etc.); understanding the assessment of various educational diagnoses (e.g., learning disabilities, intellectual disability); and using academic assessment results to design effective academic interventions.

**5440. Social, Emotional, and Behavioral Intervention in Schools**

Three credits.

Provides students with knowledge and skills related to varied evidence-based methods in psychology and education to promote the social, emotional, and behavioral health and well-being of youth in schools.

**5445. Counseling in School Psychology**

Three credits.

Provides students with both instruction and practice in counseling individuals and groups within school contexts using a prevention framework. Focus on evidence-based, cognitive-behavioral interventions that address the range of referral questions presented in school settings.

**5455. History and Systems of Psychology**

Three credits.

Addresses the history and systems of psychology, using a lens that integrates theoretical, empirical, and applied perspectives. Key figures and events in the history of psychology are explored, providing connections to the current status of the field, the many sub-disciplines of psychological research, and the applied specialties.

**5491. School Psychology Internship**

Variable (3-6) credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

Post practicum experience in School Psychology under the supervision of a fully trained and certified professional School Psychologist for the duration of one school year along with an accompanying on-campus seminar. All core courses in the School Psychology program must be completed prior to beginning the internship.

**5510. Learning: Its Implication for Education**

Three credits.

Nature and types of learning, transfer of training, motivation, nature of instructional outcomes, with particular attention to individual differences among elementary and secondary school pupils.

**5515. Professional Seminar in Cognition and Instruction**

One credit. May be repeated for a maximum of three credits.

A professional seminar designed to present topics, paradigms, models, and theories in the various fields of educational psychology. The current research programs of the graduate faculty in Cognition and Instruction are presented for discussion in a seminar format.

**5520. Instructional Design**

Three credits.

Overview of the field of instructional design: instructional theories, prescriptive models, instructional strategies, issues and trends as they relate to the comprehensive development of instructional systems.

**5530. Theories of Learning, Cognition and Instruction**

Three credits.

Behavioral and cognitive psychology as it applies to instruction.

**5540. Research Ethics in Education and Psychology**

Two credits.

Ethical issues related to educational and psychological research, including working with institutional review boards, informed consent, deception research, conducting research, reporting research findings, sharing and storing data, record keeping, and APA, APS, ACA, and AERA ethics policies.

**5601. Principles and Methods in Educational Research**

Three credits.

Methods of research in education designed for Master's level students.

**5602. Educational Tests and Measurements**

Three credits.

The development of measurement and evaluation techniques.

**5605. Quantitative Methods in Research I**

Three credits.

Quantitative procedures and analysis of computer output including descriptive and inferential statistics through one-way analysis of variance.

**5607. Quantitative Methods in Research II**

Three credits.

Quantitative procedures and analysis of computer output including factorial analysis of variance, analysis of covariance, and multiple regression.

**5610. Applied Regression Analysis for the Education Sciences**

Three credits.

Multiple regression analysis and related techniques with applications to research in education. Topics include assumptions and inference; matrix representations; diagnostics and remedial measures; polynomial regression and interaction models; treatment of categorical independent variables, autocorrelation of errors in time series data, problems of missing values and selection bias, and logistic and ordinal regression models.

**5613. Multivariate Analysis in Educational Research**

Three credits. Prerequisite: Instructor consent.

An extension of EPSY 5607. Practical emphasis on multiple regression, canonical correlation, multivariate analysis of variance and covariance, discriminant function analysis, and factor analysis.

**5621. Construction of Evaluation Instruments**

Three credits.

The theory and construction of assessment instruments in the affective domain.

**5710. Introduction to Gifted Education and Talent Development**

Three credits.

Issues encountered in developing giftedness and talents in students: the nature of exceptional abilities, the history of special provisions, major

scientific studies dealing with superior abilities, and contemporary educational systems and models.

#### **5720. Developing Schoolwide Enrichment Programs**

Three credits.

An overview of the theory and research behind and components within the Schoolwide Enrichment Model. Practical techniques for implementing the model in classrooms and school districts.

#### **5740. Strategies for Differentiating the Grade Level Curriculum**

Three credits.

Instructional and managerial techniques for use within or between classrooms to address learning differences among students. Strategies for improving academic achievement and success of diverse learners. Current and promising practices, as well as relevant research.

#### **5750. Enhancing Creativity in the Classroom**

Three credits.

The identification of creative thinking and problem solving and the development and implications of creativity training materials and teaching strategies for the classroom.

#### **5760. Improving Students' Thinking Skills**

Three credits.

Designed for teachers and administrators who wish to acquire more information about current research, trends and practices within the field of thinking skills instruction. An overview of the field, with special emphasis on research-based practices, major programs, and models for the improvement of thinking skills.

#### **5780. Social and Emotional Components of Giftedness and Talent Development**

Three credits.

Review of current research on affective growth and potential adjustment problems of gifted and talented youth. Vocational concerns, self-concept, self-esteem, and the teacher's role in preventing or remediating affective problems related to giftedness.

#### **5850. Introduction to the Science of Creativity**

Three credits.

Compare and contrast major definitions, theories and measures of creativity; to explain how creativity interacts with other related constructs (such as intelligence, personality and motivation); critique past empirical work on creativity; and apply past research toward forming your own research question.

#### **6103. Grant Writing**

Three credits.

The grant procurement process is covered from identifying funding sources through initial grant management with a focus on actually writing a grant proposal.

#### **6194. Doctoral Seminar**

Variable (1-3) credits. May be repeated for credit.

Cooperative study of developments and problems in the student's area of study.

#### **6240. Academic Motivation: Theory, Research and Practice**

Three credits. Prerequisite: EPSY 5510.

Examines theory, research and practice related to motivation, particularly the motivation to learn in academic settings. Introduces students to the field of the psychological study of motivation to learn in school settings; to explore the conceptual and practical value of framing of school and learning from a motivational and developmental perspective; to assist students in exploring how motivational theory and research may relate to their own areas of interest and help them in integrating motivational constructs into their research; and for participants to learn from each other and together read interesting new work on motivation to learn (a caring community is the crucible within which learning of enduring value unfolds). Designed for graduate students who are studying issues related to motivation to learn in school settings during the first two decades of life.

#### **6301. Advanced Group Processes**

Three credits. Prerequisite: Instructor consent.

Participants and observers in a basic group course. Processing and analyzing of group processes.

#### **6302. Prevention and Intervention in Schools, Education, and the Community**

Three credits.

The theory, practice, and science of primary prevention of human problems in schools, education, and the community. Prevention concepts and case studies are presented by the faculty. Students give analysis and critique of course content and develop personal perspectives on prevention interventions and skills in the context of their careers.

#### **6304. The Psychology of Men and Boys in Counseling and Education**

Three credits.

The negative effects of men's socialization and gender role conflicts are reviewed from the theory and empirical research in the psychology of men. Lectures, discussions, experiential activities, and psychobiographies of famous men and women are used to promote personal learning and psychoeducational outcomes. Implications for counseling, teaching, and more positive views of men are explored.

#### **6469. Single Subject Research in Education**

Three credits.

Introductory and advanced content related to features, types, development, and use of "Single Subject Research Designs" to study of interventions and programs for improving the academic and social behavior outcomes for children and youth in schools.

#### **6491. Doctoral Internship in School Psychology**

Variable (3-6) credits. May be repeated for a maximum of 12 credits.

Intensive, one year supervised experience in school psychology setting totaling 1,500 or 2,000 hours of service.

#### **6494. Doctoral Practicum**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

The implementation and application of theory in the student's area of specialization.

#### **6550. Situated Cognition**

Three credits. Prerequisite: EPSY 5510, 5520, and EPSY 5530.

Theory, research and applications of situated cognition and situated learning.

#### **6601. Methods and Techniques of Educational Research**

Three credits. Prerequisite: EPSY 5605 or a master's level introductory educational statistics class.

A survey of the principal methods employed in the investigation of educational problems, including problem formulation, stating hypotheses, sampling, instrument design, types of research methods and design principles.

#### **6611. Hierarchical Linear Modeling**

Three credits.

Theory and applications of hierarchical linear modeling, including organizational and longitudinal multilevel models.

#### **6615. Structural Equation Modeling**

Three credits.

An introduction to structural equation modeling. Develop, modify, and interpret a variety of structural equation models commonly used in social science research. Linear models with only observed variables (path analysis), latent variable models without causal paths (confirmatory factor analysis), and latent variable models with causal paths (structural equation modeling). Conceptual understanding, application, and interpretation of structural equation models.

#### **6619. Advanced Modeling Using Latent Variable Techniques**

Three credits. Prerequisite: EPSY 6611 and 6615.

Covers several advanced modeling techniques, including multilevel confirmatory factor analysis, multilevel structural equation modeling, latent class analysis, factor mixture modeling, and growth mixture modeling. Emphasis will be on specification, application, evaluation, and interpretation of these models.

#### **6621. Program Evaluation**

Three credits. Prerequisite: EPSY 5605, 5607, and 6601.

An overview of quantitative and qualitative procedures used in the evaluation of educational programs. Current trends and practical applications are stressed.

#### **6623. Advanced Program Evaluation**

Three credits. Prerequisite: EPSY 6621; instructor consent required. May be repeated once for credit.

Graduate seminar on advanced content related to evaluation context, evaluators, methods, and research, with emphasis on conducting evaluations, current trends, and practical applications.

#### **6636. Measurement Theory and Application**

Three credits.

Advanced course in measurement and evaluation. Emphasizes current issues in measurement and the scientific procedures reflected in the literature that suggest alternative solutions to these issues.

#### **6637. Item Response Theory**

Three credits.

Advanced course in educational and psychological testing theory. Emphasizes the principles and processes of the most sophisticated approach to educational test construction and scoring available today.

**6638. Advanced Topics in Item Response Theory**

Three credits. Prerequisite: EPSY 6637; instructor consent required.

Applications of IRT to measurement problems such as equating, detection of differential item functioning, and adaptive testing. Extensions of unidimensional dichotomous models to polytomous responses and multidimensional tests. Extensive use of Monte Carlo data to investigate psychometric issues.

**6639. Advanced Techniques for Psychometric Research**

Three credits.

Monte Carlo techniques for psychometric research. Design and carry out research studies for investigating new and existing psychometric and statistical procedures using simulated data. Estimation procedures for linear and nonlinear models for observed and latent variables. Students will develop their own custom computer programs and use existing software packages. Programs will primarily be written in Fortran 90.

**6651. Introduction to Methods for Causal Inference Using Educational Data**

Three credits. Prerequisite: EPSY 5605 and 5607.

A survey of four main designs for making causal inferences from educational data and the rationales for the use of these designs. The designs considered are: Randomized experiments, regression discontinuity, instrumental variables and non-equivalent control group. The course introduces Campbell's validity framework and applies this framework to the designs considered. Techniques for sample size planning and power analysis are introduced. Other topics covered include: mediation and moderation analysis and the ethics on research on human populations.

**6655. Advanced Causal Inference with Data**

Three credits. Prerequisite: EPSY 5610 and 6651.

This course is an exploration of the problems that arise in making inferences about causal effects from non-experimental data and some potential solutions to those problems. Topics covered include: regression approaches to causal inference; paradoxes that arise when interpreting non-experimental data; the "potential outcomes" approach to causal inference (often called Rubin's Causal Model); univariate and multivariate matching methods; multivariate distance measures; propensity score estimation methods; using the propensity score to match, subclassify and weight; Instrumental Variables applications of Rubin's Causal Model; Directed Acyclic Graphs.

**6770. Curricular Options for High Ability Learners**

Three credits.

Curriculum theory and techniques with special attention to the development of instructional materials.

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## Electrical and Computer Engineering (ECE)

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**5101. Introduction to System Theory**

Three credits. Recommended preparation: ECE 3101.

Modeling and analysis of linear systems. Introduction to functions of a complex variable.

Linear algebra with emphasis on matrices, linear transformations on a vector space, and matrix formulation of linear differential and difference equations. State variable analysis of linear systems. Transform methods using complex variable theory, and time-domain methods including numerical algorithms.

**5121. Multivariable Digital and Robust Control Systems**

Three credits. Prerequisite: Instructor consent.

Analysis and design of robust multivariable control systems incorporating a digital computer as the controlling element. Topics include: Mathematical models of discrete-time systems, Discretization of continuous-time systems, Measures of control system performance, Classical single input-single output design methods, Compensator design via discrete-equivalent and direct design methods, State variable design via discrete equivalent and pole placement methods, Linear quadratic regulator (LQR) control, H<sub>2</sub> and H-infinity optimal control, numerical optimization and nonlinear control.

**5201. Electromagnetic Wave Propagation**

Three credits.

Engineering application of Maxwell's field theory to electromagnetic wave propagation in various media. Reflection, refraction, diffraction, dispersion, and attenuation. Propagation in seawater and in the ionosphere.

**5211. Semiconductor Devices and Models**

Three credits.

Band theory, conduction in semiconductors, carrier statistics, deep levels, impurities with multiple charge states, heavy doping effects, non-uniform doping. Non-equilibrium processes, carrier scattering mechanisms, the continuity equation, avalanche multiplication, carrier generation, recombination, and lifetime. P-n junctions, non-abrupt junctions, various injection regimes, and device models. Metal semiconductor junctions, current transport mechanisms, and models. BJT, JFET, MESFET, and MOSFET, and device models.

**5212. Fundamentals of Opto-Electronic Devices**

Three credits.

Absorption and emission mechanisms in direct and indirect semiconductors. Semiconductor optoelectronic devices such as light-emitting diodes, injection lasers, photocathodes, solar cells, and integrated optics.

**5223. Nanophotonics**

Three credits. Prerequisite: ECE 3223 or instructor consent.

Principles and applications of nanophotonics with focus on optical metamaterials, plasmonics, and photonic bandgap crystals. Topics covered include electric plasma, magnetic plasma, optical magnetism, negative index metamaterials, localized and non-localized surface plasmon polaritons, photonic bandgap structures, superlens, optical cloaking, surface enhanced Raman spectroscopy, transformation optics, plasmonic sensors, plasmonic waveguides.

**5225. Electron Device Design and Characterization**

Three credits. Prerequisite: Instructor consent. Recommended preparation: ECE 4211.

Recommended Preparation: ECE 4211 or equivalent course Design and evaluation of micro/nano electronic devices using state-of-the-art computer simulation tools, experimental electrical characterization of semiconductor devices and overview of modern electronic devices such as high-performance MOSFETs, TFTs, solar cells, non-volatile memories, CCDs, thermoelectric power generators. The electronic device (such as nanometer scale field effect transistor) design project will involve use of Synopsys tools to simulate the fabrication process, device simulation and performance evaluation.

**5231. Fund of Photonics**

Three credits. Prerequisite: Instructor consent.

Principles of optics including rays, waves, beams, electromagnetics, polarization and statistics. Basic postulates, simple optical components, graded index and matrix optics, monochromatic waves, interference, polychromatic light, Gaussian beams and propagation, diffraction, Fourier transforms, holography, dispersion and pulse propagation, polarizing devices and applications. Concepts of coherence and partial coherence as applied to various light sources in optical experiments and systems.

**5232. Optoelectronic Devices**

Three credits.

Optoelectronic devices as applied to fiber optic communications, optical switching and interconnects. Semiconductor laser devices, including dc, ac small signal, ac large signal, and noise with emphasis upon analytical models. Vertical cavity devices and technology. Semiconductor optical amplifiers, waveguide and vertical cavity modulators, photodetectors, optical switches, receivers and transmitters. Techniques for OE integration and the relevance of bipolar and field-effect devices for monolithic integration. Technologies for optoelectronic integration for telecom and datacom optical interconnect. WDM techniques for optical networks.

**5242. Micro-Optoelectronic Devices and IC Fabrication**

Three credits. Prerequisite: ECE 3221 and 4211; not open for credit to students who have passed ECE 4242.

Semiconductor wafer characterization using Hall effect, X-ray diffraction, and Photoluminescence; Semiconductor wafer processing using Diffusion, Oxidation, Epitaxial growth and/or Qdot self-assembly, Photolithographic techniques; Project work including design, modeling and fabrication of solar cells, FETs, Memory, LED and Lasers, sensors, and IC building blocks for digital and analog circuits.

**5261. Memory Device Technologies**

Three credits. Not open for credit to students who have passed ECE 4261.

Current and future digital solid-state memory device technologies including DRAM, SRAM, flash memory, ferroelectric memory, magnetoresistive memory, phase-change memory and resistive memory, with an emphasis on the underlying physical mechanisms.

**5402. Computer Architecture**

Three credits. Recommended preparation: CSE 4302 or the equivalent.

Provides an in-depth understanding of the inner workings of modern digital computer systems. Traditional topics on uniprocessor systems such as performance analysis, instruction set architecture, hardware/software pipelining, memory hierarchy design and input-output systems will be discussed. Modern features of parallel computer systems such as memory consistency models, cache coherence protocols, and latency reducing/hiding techniques will also be addressed. Some experimental and commercially available parallel systems will be presented as case studies.

**5451. Introduction to Hardware Security and Trust**

Three credits. Prerequisite: ECE 3401. This course and ECE 4451 may not both be taken for credit.

Fundamental hardware security and trust issues related to integrated circuits. Cryptographic hardware, physical and invasive attacks, side-channel attacks, physically unclonable functions, hardware-based true random number generators, watermarking of Intellectual Property (IP) blocks, FPGA security, IC/IP piracy, access control, hardware Trojan detection and prevention in IP cores and integrated circuits.

**5510. Power System Analysis**

Three credits. Prerequisite: ECE 2001 or equivalent.

Fundamentals of power system planning, operation, and management. Power generation and distribution. Modeling of AC generator, AC and DC motors, transformer and cable. Power flow solution. Modern power system monitoring/control, fault analysis, and transient stability analysis using computer tools. Use of power system simulation tools for power system planning and design.

**5512. Power Distribution**

Three credits. Prerequisite: ECE 3231.

Principles of distribution system planning, automation and real-time operation with applications. Concepts of AC/DC Electricity. Three-phase power distribution as well as DC and Hybrid circuits. Load flow calculations, fault analysis, and reliability evaluation. Distributed power resources. Distribution system protection and reconfiguration. Smart distribution technologies. Efficient and resilient energy utilization.

**5520. Advanced Power Electronics**

Three credits. Prerequisite: ECE 3211.

Advanced converter and inverter topologies for high efficiency applications. Non-ideal component characteristics. Necessary components such as gate drive circuits and magnetic component design (that are not covered in introductory power electronics courses).

**5530. Modeling and Control of Electric Drives**

Three credits. Prerequisite: ECE 3212.

Several topics related to modeling and control of electric drives. Fundamental equations related to inductance and flux variations in a rotating machine, leading to torque production. Reference frame theory and transformations for modeling purposes. Dynamic models of three-phase induction and permanent-magnet synchronous

machines. Basic modeling of power electronic converters for electric drives, with focus on three-phase DC/AC inverters. Various control strategies with focus on vector control and different power electronic switching schemes in electric drives.

**5540. Electrical System Protection and Switchgear**

Three credits. Prerequisite: Instructor consent.

Methods to sense voltage and current in medium and low voltage applications. Voltage sensing techniques include differential voltage amplifiers, shunt voltage measurement, and potential transformers. Current sensing techniques include current transformers, Rogowski coils, series voltage measurement, and Hall-effect sensors. Solid-state and mechanical relays and timing functions. Fuses and circuit breakers at medium voltage levels with focus on ratings, application-specific selection, and response time. Protection methods, e.g. differential protection, of transformers, generators, and cables with focus on distance relays and specialized devices.

**5544. Electrical Insulation System**

Three credits. Recommended preparation: ECE 3001 and 3231 or equivalent; instructor consent required.

Introduction to electrical insulation system for low and medium voltages. Gas discharge physics and dielectrics. Sulfur hexafluoride. Outdoor insulation. Dielectric breakdown in liquids and solids. Power capacitors and inductors. MV cables and accessories. Voltage transients in MV power systems. Thermal model for MV transformers (steady-state, transient, and hot-spot temperatures identification and verification). Insulation coordination design for MV transformers, load capacity and service lifting trade-off study based on electrical and thermal over-stress analysis. Insulation system for MV and LV rotating machines (form and random wound), insulation system optimization for torque density and payload efficiency. Insulation system testing and qualification. Monitoring and diagnosis.

**6094. Seminar**

One credit. May be repeated for a maximum of eight credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Presentation and discussion of advanced electrical engineering problems.

**6095. Special Topics in Electrical and Systems Engineering**

Variable (1-3) credits. May be repeated for credit.

Classroom and/or laboratory courses in special topics as announced in advance for each semester.

**6099. Independent Study in Electrical Engineering**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Individual exploration of special topics as arranged by the student with an instructor of his or her choice.

**6102. Optimal and Model Predictive Control**

Three credits. Prerequisite: ECE 5101 and 6111; instructor consent required.

Optimal Control, including optimization techniques for linear and nonlinear systems, calculus of variations, dynamic programming, the

Pontryagin maximum principle, and computational methods. Linear Model Predictive Control, including process models and model prediction methods of state space description, transfer matrix representation, and neural network representation; and optimization methods without and with constraints. Nonlinear Model Predictive Control.

**6103. Nonlinear System Theory**

Three credits. Prerequisite: ECE 5101.

Stability of time-varying nonlinear systems. Liapunov's direct method. Describing functions. Popov's stability criterion. Adaptive control.

**6104. Information, Control and Games**

Three credits. Prerequisite: ECE 5101 and 6111.

Problems of dynamic optimization where more than one decision maker is involved, each having own payoff and access to different information. Rules of the game and roles of information; Dynamic games with symmetric information or incomplete information or asymmetric information; Moral hazard; Mechanism design; Signaling, Auctions and Pricing.

**6108. Linear Programming and Network Flows**

Three credits. Prerequisite: ECE 5101.

Computational methods for linear programming with special emphasis on sequential and parallel algorithms for Network Flow Problems. Standard and canonical forms of linear programming, revised Simplex methods, basis updates, decomposition methods, duality, shortest paths, minimal spanning trees, maximum flows, assignment problems, minimum cost network flows, and transportation problems.

**6111. Applied Probability and Stochastic Processes**

Three credits.

Statistical methods for describing and analyzing random signals and noise. Random variables, conditioning and expectation. Stochastic processes, correlation, and stationarity. Response of linear systems to stochastic inputs. Applications.

**6121. Information Theory**

Three credits. Prerequisite: ECE 6111.

Basic concepts: entropy, mutual information, transmission rate and channel capacity. Coding for noiseless and noisy transmission. Universal and robust codes. Information-theoretic aspects of multiple-access communication systems. Source encoding, rate distortion approach.

**6122. Digital Signal Processing**

Three credits.

Discrete-time signals and systems. The z-transform. The Discrete Fourier Transform (DFT). Convolution and sectioned convolution of sequences. IIR and FIR digital filter design and realization. Computation of the DFT: The Fast Fourier Transform (FFT), algorithms. Decimation and interpolation. Parametric and nonparametric spectral estimation. Adaptive filtering. Finite word length effects.

**6123. Advanced Signal Processing**

Three credits. Prerequisite: ECE 6111 and 6122.

Wiener filter theory. Linear prediction. Adaptive linear filters: LMS and RLS algorithms, variants, lattice structures and extra-fast implementation. Convergence properties. High-resolution spectral estimation. Hidden Markov models, Monte-Carlo

methods for signal processing. Multiresolution decomposition and wavelets. Blind methods.

#### 6124. Advanced Signal Detection

Three credits.

Focus on discrete-time detection of signals in noise that is not necessarily Gaussian. Topics include: classical Neyman-Pearson and Bayes theory, efficacy and asymptotic relative efficiency; some canonical noise models; quantized detection; narrowband signal detection; distance measures and Chernoff bounds; sequential detection; robustness; non-parametric detection; continuous-time detection and the Karhunen-Loève expansion.

#### 6125. Digital Image Processing

(Also offered as BME 6125.) Three credits.

Problems and applications in digital image processing, two-dimensional linear systems, shift invariance, 2-D Fourier transform analysis, matrix Theory, random images and fields, 2-D mean square estimation, optical imaging systems, image sampling and quantization, image transforms, DFT, FFT, image enhancement, two-dimensional spatial filtering, image restoration, image recognition, correlation, and statistical filters for image detection, nonlinear image processing, and feature extraction.

#### 6126. Fundamentals of Optical Imaging

(Also offered as BME 6126.) Three credits.

Learning optical imaging fundamentals. Topics include: review of two-dimensional linear system theory; scalar diffraction theory, wave optics, Fresnel and Fraunhofer diffraction; imaging properties of lenses; image formation; optical resolution in imaging, frequency analysis of optical imaging systems; imaging with coherent and incoherent sources, coherent transfer function; optical transfer function, point spread function, fundamentals of microscopy, two-dimensional spatial filtering; coherent optical information processing; frequency-domain spatial filter synthesis; holography.

#### 6141. Neural Networks for Classification and Optimization

Three credits.

This course provides students with an understanding of the mathematical underpinnings of classification techniques as applied to optimization and engineering decision-making, as well as their implementation and testing in software. Particular attention is paid to neural networks and related architectures. The topics include: Statistical Interference and Probability Density Estimation, Single and Multi-layer Perceptions, Radial Basis Functions, Unsupervised Learning, Preprocessing and Feature Extraction, Learning and Generalization, Decision Trees and Instance-based Classifiers, Graphical Models for Machine Learning, Neuro-Dynamic Programming.

#### 6143. Pattern Recognition and Neural Networks

(Also offered as BME 6143.) Three credits.

Review of probability and stochastic processes. Statistical pattern recognition. Nonlinear signal processing and feature extraction. Correlation filters. Metrics for pattern recognition. Bayesian classifiers. Minimum probability of error processors. Supervised and unsupervised learning. Perception learning methods. Multilayer neural networks. Applications to security and encryption.

#### 6151. Communication Theory

Three credits. Prerequisite: ECE 6111.

Design and analysis of digital communication systems for noisy environments. Vector representation of continuous-time signals; the optimal receiver and matched filter. Elements of information theory. Quantization, companding, and delta-modulation. Performance and implementation of common coherent and non-coherent keying schemes. Fading; intersymbol interference; synchronization; the Viterbi algorithm; adaptive equalization. Elements of coding.

#### 6152. Wireless Communication

Three credits. Prerequisite: ECE 6122 and 6151.

Introduces basic concepts in wireless communication and networks with emphasis on techniques used in the physical layer of current and future wireless communication systems. Covers channel modeling, modulation, spread spectrum techniques, multiuser communication theory, wireless network protocols, and current cellular and PCS systems. Special topics in equalization and array signal processing are included.

#### 6161. Modern Manufacturing System Engineering

Three credits.

Issues and methods in modern manufacturing systems. Integrated product and process development. Design for quality, on-line quality control and improvement, reliability during product development, and design for testability. Computer-aided production management, production planning and scheduling, and optimization-based planning and coordination of design and manufacturing activities. Targeted toward students, professional engineers, and managers who want to have an impact on the state-of-the-art and practice of manufacturing engineering, and to improve manufacturing productivity

#### 6171. Mobile Robotics

Three credits. Recommended preparation: MATH 2410; MATH 3160 or STAT 3345; ECE 3111; familiarity with MATLAB programming.

Coordinate transformation, kinematics and dynamics, sensor modeling, specifics of camera sensors, inertial measurement unit (IMU) sensor, simultaneous localization and mapping (SLAM), EKF-SLAM, Monte Carlo localization, SLAM observability, robot control, specifics of vision-based control, and aspects of Human-robot interaction; class project with a project report.

#### 6211. Antenna Theory and Applications

Three credits.

Analysis and synthesis of antenna systems including electric- and magnetic-dipole, cylindrical, helical, reflector, lens, and traveling-wave antennas. Theory of arrays including patterns, self and mutual impedances.

#### 6212. Microwave Techniques

Three credits.

A theoretical analysis of microwave components, systems, and measuring techniques. Scattering matrix analysis is applied to microwave devices having two or more ports.

#### 6222. Advanced Semiconductor Devices

Three credits.

Fundamental properties of heterostructures, strained-layer superlattices, NIP structures, multiple quantum well, quantum wire, and quantum dot structures. Operation, modelling of the electrical characteristics, design, and applications of HBJT, HEMT, and resonant tunneling devices. Second-order effects in submicron MOSFETs and MESFETs.

#### 6226. Power Network Dynamics and Simulation

Three credits. Prerequisite: ECE 5101 or 6122 or instructor consent.

Introduction to power network dynamics with emphasis on numerical simulation techniques. Numerical integration rules for large-scale power networks, numerical oscillation and its solution, power system components, frequency-dependent transmission network, nonlinear elements, network equivalents, power network stability. Applications of network simulation to microgrid stability analysis and control design. Real-time simulation algorithms for interdependent infrastructures analysis.

#### 6231. Advanced Optoelectronics

Three credits. Prerequisite: ECE 5212.

Review of optoelectronic devices and integrated circuit (IC) technologies (analog and digital); logic gates; self-electro-optic devices (SEEDs), microlasers, Fabry-Perot (F-P) etalons and optoelectronic IC (OEICs); modulators: F-P modulators (absorptive and refractive), spatial light modulators (SLMs) and their applications; bistable devices; bistable laser amplifiers, resonant tunneling transistor lasers, and polarization bistability; optical interconnects; architectural issues and optical processors based on S-SEED, optical neural networks, and other devices.

#### 6232. Nonlinear Optical Devices

Three credits. Prerequisite: ECE 5231.

Wave propagation in nonlinear media, generation of harmonics in optical materials, optical parametric processes, stimulated emission and scattering processes. Device modeling and application of fiber and semiconductor lasers, optical amplifiers and modulators. Electro-optic, acousto-optic, and magneto-optic devices. Soliton generation and propagation.

#### 6242. VLSI Fabrication Principles

Three credits. Prerequisite: Instructor consent.

Semiconductor materials and processing, emphasizing compound semiconductors, optoelectronic materials, shallow devices, and fine-line structures. Semiconductor material properties; phase diagrams; crystal growth and doping; diffusion; epitaxy; ion implantation; oxide, metal, and silicide films; etching and cleaning; and lithographic processes.

#### 6243. Nanotechnology

Three credits.

Nanoelectronic and optoelectronic devices: Quantum confinement in 1D, 2D and 3D (quantum wells, wires, and dots) structures; density of states and carrier density in low-dimensional structures; fabrication methodology for quantum wire transistors and lasers; single-electron transistors/tunneling devices; growth and characterization of nanostructured materials with grain sizes in the range of 10-50 nm. Organic monolayers: Langmuir-Blodgett monolayers, Self-Assembled

monolayers, Multi-layer structures, technological applications of organic thin films.

#### **6244. Nanotechnology - II (Laboratory Course)**

Three credits. Prerequisite: Instructor consent.

Growth and characterization of carbon nanotubes using vapor phase nucleation; Growth of cladded quantum dots using liquid and/or vapor phase techniques; Characterization using AFM and TEM and Dynamic scattering techniques; Nano-device processing highlighting E-Beam lithography, and self-assembly techniques; Project work involving fabrication of devices including LEDs, FETs and memor, detectors and sensors using quantum dots and nanotubes/wires.

#### **6246. Heteroepitaxy of Semiconductors**

Three credits. Prerequisite: Instructor consent.

Properties of semiconductors, including crystal structure, elastic properties, and properties of defects. Surface considerations in heteroepitaxy. Heteroepitaxial growth methods, including molecular beam epitaxy and metalorganic vapor phase epitaxy. Mismatched heteroepitaxy of a single, uniform layer, including pseudomorphic growth, equilibrium considerations, kinetically-limited strain relaxation, and threading dislocations. Design and growth of graded and multilayered metamorphic structures, and dislocation dynamics in them. Characterization of heteroepitaxial structures. Defect and strain engineering in semiconductor heterostructures.

#### **6421. Advanced VLSI Design**

Three credits. Recommended preparation: ECE 3421 and ECE 3302 (or equivalent).

Advanced concepts of circuit design for digital VLSI components in state of the art MOS technologies. Emphasis is on the circuit design, optimization, RTL design, synthesis, and layout of either very high speed, high density or low power circuits and systems for use in applications such as micro-processors, signal and multimedia processors, memory and periphery. Other topics include challenges facing digital circuit designers today and in the coming decade, such as the impact of scaling, deep submicron effects, interconnect, signal integrity, power distribution and consumption, and timing.

#### **6422. VLSI CAD Algorithms**

Three credits.

Very large-scale integrated circuit (VLSI) computer-aided design (CAD) tools, optimization techniques, and design automation algorithms, such as branch and bound, genetic algorithms, simulated annealing, and linear programming. VLSI physical design process including partitioning, floor planning, placement, routing, compaction, and pin assignment.

#### **6432. VLSI Design Verification and Testing**

Three credits. Instructor consent.

Introduction to the concepts and techniques of VLSI (very large scale integration) design verification and testing, details of test economy, fault modeling and simulation, defects, automatic test pattern generation (ATPG), design for testability (DFT), scan and boundary scan architectures, built-in self-test (BIST) and current-based testing. State-of-the-art tools are used for ATPG, DFT, test synthesis and power analysis and management.

#### **6435. Advanced Numerical Methods in Scientific Computation**

Three credits. Prerequisite: ECE 5101.

Development, application and implementation of numerically stable, efficient and reliable algorithms for solving matrix equations that arise in modern systems engineering. Computation of matrix exponential, generalized inverse, matrix factorizations, recursive least squares, eigenvalues and eigenvectors, Lyapunov and Riccati equations.

#### **6437. Computational Methods for Optimization**

Three credits. Prerequisite: ECE 5101.

Computational methods for optimization in static and dynamic problems. Ordinary function minimization, linear programming, gradient methods and conjugate direction search, nonlinear problems with constraints. Extension of search methods to optimization of dynamic systems, dynamic programming.

#### **6439. Estimation Theory and Comp Algorithms**

Three credits. Prerequisite: ECE 5101 and 6111.

Estimation of the state and parameters of noisy dynamic systems with application to communications and control. Bayesian estimation, maximum-likelihood and linear estimation. Computational algorithms for continuous and discrete processes, the Kalman filter, smoothing and prediction. Nonlinear estimation, multiple model estimation, and estimator Kalman, multiple model estimation, and estimator design for practical problems.

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## **Engineering (ENGR)**

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#### **5300. Special Topics in Engineering**

Variable (1-6) credits. May be repeated for a maximum of 12 credits.

Classroom and/or laboratory course in special topics as announced in advance for each semester.

#### **5311. Professional Communication and Information Management**

Three credits.

Development of the advanced communication skills as well as information management required of engineers and engineering managers in industry, government, and business. The design and writing of technical reports, articles, proposals and memoranda that address the needs of diverse organizational and professional audiences; the preparation and delivery of organizational and technical oral and multimedia presentations and briefings; team building skills with an emphasis on communications; and knowledge management.

#### **5312. Engineering Project Planning and Management**

Three credits. Prerequisite: Department consent.

The methodology for managing engineering projects; including project lifecycle, strategic planning, budgeting, and resource scheduling. Also, work estimating, evaluating risk, developing the project team, project tracking and performing variance analysis. Case studies are used as class and homework assignments to focus the class on the topics presented.

#### **5314. Advanced Engineering Mathematics**

Three credits.

Advanced math topics including Laplace, Fourier and z-Transform methods, probability

theory, ordinary differential equations and systems of ODEs, partial differential equations, vector calculus, elements of statistics, linear and non-linear optimization, matrix theory, and special functions like Bessel, Legendre, and gamma. This course is set up as modules. Students will be required to complete certain modules depending on their background and concentrations.

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## **English (ENGL)**

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#### **5100. The Theory and Teaching of Writing**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

An exploration of the relationship between the theories and practice of writing, with attention given to the teaching of writing and recent developments in rhetoric and composition.

#### **5150. Advanced Research Methods**

One credit. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Consideration of the question, "What is a research method?" and introduction to critical methods relevant to humanities-based research.

#### **5160. Professional Development in English**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

Includes critical reflection on the academy, as well as practical instruction in writing application materials for conferences, grants, and academic employment, and in revising a seminar paper for publication.

#### **5182. Practicum in the Teaching of Writing**

One credit. Prerequisite or corequisite: ENGL 5100.

Guided development of teaching in the University of Connecticut First-Year Writing Program. Implementing theories of teaching and writing; meeting program goals and objectives; selecting texts; drafting writing assignment prompts; developing classroom work; guiding peer feedback; reading, responding to and evaluating student work. Supervision includes one-on-one, group, and peer. Required of all incoming graduate-student FYW instructors.

#### **5200. Children's Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

A study of Children's Literature from the aesthetic, historic, psychological and sociological points of view. Major themes and genres. Standards of literary criticism.

#### **5220. History of the English Language**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

The development of the sounds, forms, order, and vocabulary of Standard English; an introduction to the methods of modern descriptive linguistics, and to the application of linguistic fact and theory to the teaching of English.

**5240. The Bible as Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

A study of major themes and literary characteristics of writing from the Hebrew Bible and New Testament. The Bible's relevance to modern literary criticism.

**5310. Old English**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

A study of the language and literature of pre-conquest England.

**5315. Medieval Literature**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

A study of medieval literature, exclusive of Chaucer.

**5318. Chaucer**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

**5320. Shakespeare**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**5323. Renaissance Drama**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

**5325. Renaissance I: 1485-1603**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

A study of major writers and literary traditions of the sixteenth century, exclusive of the drama.

**5326. Seventeenth-Century Literature**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

**5329. Milton**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

**5330. Restoration and Eighteenth Century Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**5340. Romantic Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

Open to graduate students in English, others with permission.

**5345. Studies in Victorian Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**5350. Modern British Writers**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**5360. Irish Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**5410. American Literature to 1776**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**5420. American Literature 1776-1865**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**5430. American Literature 1865-1914**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**5440. American Literature since 1914**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**5500. Literary Criticism**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

A study of the major documents of literary criticism and theory from Plato and Aristotle to the present.

**5530. World Literature in English**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

Selected works of colonial and post-colonial literature from Africa, South Asia, the Caribbean, Australia, New Zealand, Canada, etc.

**5550. Rhetoric and Composition Theory**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

Classical and contemporary rhetorical theory, current research in composition.

**5650. Digital Humanities**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

An introduction to the histories, methodologies, and theories of the digital humanities, and to the practices and tools of digital humanities projects.

**6000. Independent Study**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

A reading course normally open only to doctoral candidates.

**6200. Seminar in Children's Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for credit.

Major authors, themes, or literary movements in American or British children's literature.

**6270. Seminar in Modern Poetry**

Three credits. Prerequisite: Open only to English graduate students, others with consent.

**6310. Seminar in Beowulf**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

**6312. Seminar in Old Irish**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent. With a change of content, may be repeated for credit.

Language and literature of Medieval Ireland.

**6313. Seminar in Old Norse**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent.

Old Norse language and literature.

**6315. Seminar in Medieval Literature**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent. May be repeated for credit.

**6320. Seminar in Shakespeare**

Three credits. Prerequisite: Open only to English graduate students, others with consent. May be repeated once for credit.

**6325. Seminar in Renaissance Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for a total of six credits.

**6330. Seminar in Eighteenth-Century Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for a total of six credits.

**6340. Seminar in Romantic Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent. May be repeated for a maximum of 12 credits.

**6345. Seminar in Victorian Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for a total of six credits.

**6360. Seminar in Irish Studies**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for credit.

Major authors, movements, or themes in Irish literature.

**6400. American Ethnic Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for credit.

**6410. American Literature and Culture**

Three credits.

An introduction to a particular literary era and the cultural influences on its literature. The influence of a literary era on cultural change.

**6420. American Literary Movements**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for a total of six credits.

Introduction to a particular American literary movement.

**6450. Special Topics in American Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for credit.

**6500. Seminar in Literary Theory**

Three credits. Prerequisite: Open only to English graduate students, others with consent. May be repeated for a maximum of 12 credits.

**6530. Seminar in World Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for credit.

Major authors, movements, or themes in world literature written in English.

**6540. Seminar in Literature and Human Rights**

Three credits. Prerequisite: Open only to English graduate students, others with consent. May be repeated for a maximum of nine credits.

The interdisciplinary study of literature and human rights discourse.

**6550. Seminar in Rhetoric and Composition Theory**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for a total of six credits.

**6575. Seminar in Women and Literature**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent. With a change in content, may be repeated for a total of six credits.

**6600. Creative Writing Workshop**

Three credits. Prerequisite: Open only to English graduate students, others with consent. May be repeated for a maximum of 12 credits.

**6650. Seminar in Digital Humanities**

Three credits. Prerequisite: Open only to English and Medieval Studies graduate students, others with consent. With a change in content, may be repeated once for credit.

Focused study of histories, methodologies, and theories of the digital humanities, and practices and tools of digital humanities projects.

**6700. Seminar in Major Authors**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for a total of nine credits.

**6750. Special Topics in Language and Literature**

Three credits. Prerequisite: Open only to English graduate students, others with consent. With a change in content, may be repeated for credit.

**6800. American Studies: Methods and Major Texts**

(Also offered as AMST 6000 and HIST 6000.) Three credits. Prerequisite: Open only to English, History, and Political Science graduate students.

Introduction to the methodologies and topics of American Studies through a survey of major texts in the field, past and present. Course also provides a history of the field.

**6850. American Studies: Special Topics**

(Also offered as AMST 6500 and HIST 6500.) Three credits. Prerequisite: Open only to English, History, and Political Science graduate students. With a change in topic, may be repeated once for credit.

Detailed study of a specific topic in American cultural studies with an emphasis on developing skills in interdisciplinary research. Topics vary from semester to semester.

**Environmental Engineering (ENVE)****5020. Independent Graduate Study in Environmental Engineering**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Special problems in environmental engineering as arranged by the student with a supervisory instructor of his or her choice.

**5090. Advanced Topics in Environmental Engineering**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Classroom or laboratory courses as announced for each semester.

**5094. Seminar in Environmental Sciences and Engineering**

Zero credits.

Extended discussions on presentations contributed by staff, students and outside speakers. A certificate of completion will be issued from the Environmental Engineering Program.

**5210. Environmental Engineering Chemistry - I**

Three credits.

Quantitative treatment of chemical behavior in environmental systems. Thermodynamics and kinetics of acid/base, complexation, precipitation/dissolution, sorption and redox reactions; degradation and partitioning of organic contaminants; software for speciation and partitioning computation.

**5211. Environmental Organic Chemistry**

(Also offered as CE 5211.) Three credits.

Environmental organic chemistry: ideal and regular solution thermodynamics; linear free energy relations; estimation of vapor pressure, solubility, and partitioning behavior, abiotic organic compound transformations; chemical fate modeling.

**5221. Transport and Transformation of Air Pollutants**

(Also offered as CE 5221.) Three credits.

Transport and deposition of gaseous and aerosol pollutants; chemical formation and reactions of oxidants and acidic compounds.

**5240. Biodegradation and Bioremediation**

Three credits.

Biochemical basis of the transformation of key organic and inorganic pollutants; quantitative description of kinetics and thermodynamics of pollutant transformation; impact of physiochemical and ecological factors on biotransformation.

**5252. Environmental Remediation**

Three credits.

Regulatory framework. Soil clean-up criteria. Risk analysis. In situ and ex situ Treatment technologies: chemical oxidation, chemical reduction, pump-and-treat, permeable reactive barriers, solidification, stabilization, thermal processes, bioremediation.

**5310. Environmental Transport Phenomena**

Three credits.

Development and solutions of partial differential equations describing diffusion, advection, and sources/sinks common to transport of mass, energy, and momentum. Mass sources/sinks used to

describe sorption and chemical reaction. Extension to dispersion and turbulent mixing. Applications to predicting the movement of environmental contaminants.

**5311. Environmental Biochemical Processes**

Three credits.

Major biochemical reactions; stoichiometric and kinetic description; suspended and attached growth modeling; engineered biotreatment systems for contaminant removal from aqueous, gaseous, and solid streams; process design.

**5320. Quantitative Methods for Engineers**

Three credits. Not open for credit to students who have passed NRME 5605.

Topics on data analysis: random variables and probability distributions, parameter estimation and hypothesis testing, simple and multiple regression; Monte Carlo simulation; autoregression and models for time series; analytical solutions of ordinary and partial differential equations; Fourier series; numerical solutions of ordinary differential equations; solution of partial differential equations with finite differences; basics of modeling.

**5330. Probabilistic Methods in Engineering Systems**

Three credits.

Common probabilistic models used in engineering and physical science design, prediction, and operation problems; derived distributions, multivariate stochastic models, and estimation of model parameters; analysis of data, model building and hypothesis testing; uncertainty analysis.

**5331. Predictive Analytics for Scientists and Engineers**

Three credits. Prerequisite: Instructor consent.

Topics include exploratory data analysis, clustering, dimensionality reduction, classification and regression models, text mining, geospatial data processing and more. Individual in-depth data analysis projects. Some background in programming and statistics desired.

**5530. Geoenvironmental Engineering**

Three credits.

Principles of solid waste management; design of landfills and waste containment systems; compacted clay liners and slurry walls; site investigation, soil and groundwater sampling and testing; overview of soil remediation techniques.

**5810. Hydrometeorology**

Three credits.

Global dynamics of aquatic distribution and circulation. Hydrologic cycle, atmospheric circulation, precipitation, interception, storage, infiltration, overland flow, distributed hydrologic modeling, and stream routing.

**5811. Hydroclimatology**

Three credits.

Focuses on the physical principles underlying the spatial and temporal variability of hydrological processes. Topics include atmospheric physics and dynamics controlling the water/energy budgets; global water cycle, its dynamics, and causes of variability/changes; occurrence of drought and flood; climate teleconnections and their hydrological application; hydrological impact of global changes; quantitative methods in hydroclimatic analysis.

**5812. Ecohydrology**

(Also offered as CE 5812.) Three credits.

Focuses on the interactions between ecological processes and the water cycle, emphasizing the hydrological mechanisms underlying various terrestrial ecological patterns and the ecological properties controlling the hydrologic and climatic regimes. Topics include conceptual understanding of hydrological cycle over vegetated land, quantifying and modeling flux exchanges in the soil-vegetation-atmosphere continuum, case studies on the hydrological impact of land use land cover changes, ecosystem response to environmental changes, and vegetation-climate feedback at the regional and global scales.

**5820. Unsaturated Flow and Transport**

(Also offered as CE 5820). Three credits.

Modern approaches to water flow and solute transport in partially-saturated porous media including media characterization (review); unsaturated flow in porous media (governing equations, hydraulic functions, numerical and analytical solution methods); solute transport in unsaturated media (convection dispersion, transfer functions, solutions); modeling and observational scales; coupled water flow and solute transport (model applications); special topics (preferential flow, effects of spatial variability, stochastic aspects of flow and transport, gas exchange and transport measurement methods).

**5821. Vadose Zone Hydrology**

Three credits.

Theoretical and experimental elements of primary physical and hydrological properties of porous media and processes occurring in partially-saturated soils. Practical experience in measurement and interpretation of hydrological information and methods of analysis for vadose-zone related environmental problems.

**5830. Groundwater Flow Modeling**

Three credits. Prerequisite: Department consent.

Basics of modeling with Finite Difference and Finite Element Methods. Modeling flow in saturated and unsaturated zones. Model calibration and validation. Parameter estimation. Treatment of heterogeneity. Basic geostatistics. Modeling surface-groundwater interactions. Application to field sites.

**5850. Sustainable and Resilient Water Governance and Management**

Three credits.

Overview and assessment of water institutions and management approaches that contribute (or not) to sustainable and resilient water resources under changing climate conditions, demographic and economic shifts. Course requirements include translating scientific information for water managers or writing a publishable co-authored research paper.

**6810. Advanced Fluid Mechanics I**

Three credits.

Dimensional analysis; vector analysis, circulation and vorticity; irrotational motion and velocity potential; two-dimensional flow and stream function; complex variable theory; conformal mapping; airfoils; sources and sinks; free streamline flow; water waves; three-dimensional flow.

**6920. Doctoral Teaching Practicum**

(Also offered as CE 6920.) Variable (0-3) credits.

Offered by special arrangement. Practical experience in classroom teaching with mentoring from a member of the graduate faculty.

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**European Studies (ES)**

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**5105. Independent Study in European Studies**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

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**Executive MBA (EMBA)**

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**5001. Current Business Topics**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Pertinent business issues impacting the local and global economy. Topics vary year to year.

**5111. Core Financial Statements**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Analysis and interpretation of the financial statements prepared under generally accepted accounting principles (GAAP) in the United States; financial statements prepared under other international standards, particularly international financial reporting standards (IFRS), will be addressed. Students are exposed to the theories, concepts, and mechanics used to prepare the core financial statements of the enterprise, specifically the Statement of Financial Position, Statement of Net Income, Cash Flow Statement, Statement of Changes in Owners' Equity and Statement of Comprehensive Income.

**5161. Customer Insights**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Focus on the customer as the individual decision maker to understand why and how customers make consumption decisions. Students explore qualitative and quantitative methods for understanding customer's consumption practices with attention to understanding the extent to which consumers value product benefits and the emotional aspects of consumption. Students learn the process of segmenting consumers with similar needs and desires into target groups, and examine how markets change as groups of customers collectively adopt new ways of satisfying their needs.

**5191. Value Creation and Competition**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Students analyze the challenges inherent in navigating competitive markets with the objective of adopting strategies to achieve value creation, and assess the fit between internal capabilities and the competitive landscape to identify and plan for potential threats and opportunities from environmental change.

**5212. Financial Statement Analysis**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Students gain in-depth knowledge of accounting principles used to record assets, liabilities, and owner's equity and the effects of these accounting principles on the analysis of the enterprise.

Students construct and interpret the major metrics that are used in financial statement analysis, and apply the techniques to create pro-forma financial statements.

**5231. Fundamentals of Financial Management**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Students gain tools and frameworks to analyze financial decisions based on principles of modern financial theory. Covers concepts such as discounted cash flow techniques, and its applications to valuation of common stock and bonds and lease vs. buy decisions. The time value of money is examined for both personal financial planning and business applications, and is used to value financial instruments, including common stock and bonds.

**5281. Leadership**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

The characteristics and practice of effective leadership, which can vary in times of change or crisis and in different contexts. Students examine and assess leadership in the context of teams, small and medium-sized enterprises, and multinational corporations.

**5301. Using Statistics in Business**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Aims to improve the student's sophistication at interpreting data and their ability to use data as evidence in support of strategic decisions. Students will learn to ask probing questions about the specifics of data and statistical techniques, to understand the conditions for drawing reliable inferences, to assess the validity of statistical evidence, to master fundamental quantitative computations, and to draw logical data-driven conclusions.

**5321. Domestic and International Legal Structures**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Introduction to rules of contract formation and contract performance, and remedies if contract promises are not fulfilled. Students examine issues of business negligence and compliance to standards, and assess how firms can effectively comply with domestic and global intellectual property rules and defend intellectual assets. Legal and regulatory issues related to internet commerce, data protection, and business development are explored.

**5332. Capital Budgeting and Corporate Financial Policy**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Students apply the tools and techniques of the time value of money framework to capital budgeting issues and corporate financial policy. They focus on corporate capital budgeting and valuation, investment decisions under uncertainty, market efficiency, and corporate financial policy including financing and dividend decisions. Students evaluate capital investments with a focus on how companies analyze the risk associated with future cash flows and how that risk is incorporated in the required rates of return, as well as how financing choices (stocks and bond issues) and

payout policy affect the cost of capital of large projects. Students apply two widely used models, the Capital Asset Pricing Model (CAPM) and the Weighted Average Cost of Capital (WACC) to capital budgeting problems.

#### **5413. Financial Controls**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Students take a macro perspective applying cost concepts to real-world managerial problems and make logical decisions. At a micro level, students come to understand the nature and behavior of cost and how cost is directly affected by resource (people, materials and capital) acquisition and allocation decisions. Students explore how management solves the interrelated problems of capacity, efficiency, productivity, sourcing, pricing, and profitability.

#### **5462. Driving Market Demand**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Focus on developing a competitive value proposition and marketing strategies to drive organic growth, including attracting new customers, expanding the number and value of transactions that customers make, and retaining customers for longer periods of time. Students examine customer satisfaction and profitable growth, and use customer equity as a modeling framework in which to translate market analysis, customer insight and chosen targeting and positioning into financial projections for growth.

#### **5471. Operational Analytics and Improvement**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

The management of the transformation of inputs, including labor, materials, and information, into the outputs of goods and services. Students use quantitative tools and qualitative knowledge to make decisions regarding capacity management, inventory management, planning of operations, and quality control.

#### **5514. Performance Evaluation**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

How world-class companies excel at execution and how their control systems enable their employees to execute effective strategies. Students consider the environment and the processes that companies use to maintain control of enterprise performance, the use and effects of accounting related controls in relation to choices of responsibility structures, performance measures, standards, and the internal controls that help ensure measurement reliability.

#### **5541. Domestic and Global Macroeconomics**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Domestic and global monetary policies, factors spurring economic growth and decline, trade balance and the macro level effects of trade imbalances in developed and emerging markets, as well as employment policies.

#### **5582. Managing Teams and Organization Culture**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Students explore how to foster a culture that enables maximum benefit from organizational teams. Specific topics include team creation and dynamics, motivation, organization structure, conflict, empowerment, and politics. Emphasis is placed on the unique challenges presented by cross-cultural teams.

#### **5602. Modeling Statistical and Qualitative Uncertainty**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Students will gain an understanding of how to leverage quantitative and qualitative data when making business decisions. Students will examine uncertainty inherent in future-oriented decisions based on traditional and Bayesian statistical analysis, as well as the behavioral tendencies of customers, suppliers, and employees. In addition, students will learn to recognize common decision biases and develop techniques for countering them.

#### **5603. Global Business Issues**

1-4.5 credits. Prerequisite: Open only to Business Administration Executive MBA students. May be repeated for a maximum of five credits.

Students become better versed in international business challenges, understand issues related to transnational and cross-cultural management, and examine global issues relative to their company. Students participate in an international trip to gain first-hand experience in the dynamics of international business management, engage with in-country business executives across multiple industries and functional areas, and execute a business challenge project in a foreign country.

#### **5651. Managing Information Technology**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

IT-related issues internal to the organization, and analyze challenges inherent in managing a company's IT, including evaluating information technology investment decisions, designing business processes, selecting information technologies to support such processes, implementing technology solutions, managing information technology vendors, and securing information technologies.

#### **5683. Managing Human Capital**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Examines how to manage human capital effectively in dynamic legal, social, and economic environments. Attention focuses on recruitment and selection, techniques for training and management development, performance appraisal, retention policies, and negotiation strategies and tactics.

#### **5722. Employment Law**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Critical components of employment law and how management practices can generate a workplace regulatory environment that is not only compliant, but also a source of value for the firm. Regulatory issues related hiring, firing, and evaluating employees, illegal discrimination, and the rights of and obligations toward vulnerable populations. Additional emphasis is placed on interactions with administrative agencies, protecting firm knowledge from competition, developing employer-employee

relationships, managing workplace safety, and resolving disputes.

#### **5772. Supply Chain Management**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Integration of suppliers, manufacturers, and retailers, and consider supply chain responsiveness and costs in relation to adding value to the firm. Students evaluate the importance of good supply chain design, planning, and operation, and consider key drivers of supply chain performance, including the importance of technology.

#### **5792. Strategic Fit and Coordination**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Focus on the needs of key organizational stakeholders and understanding the impact of decisions by individual functional areas on the entire organization. Students will draw upon knowledge from multiple academic disciplines to develop organizational strategies, designs, and resource allocations that can improve firm performance from a holistic perspective.

#### **5842. Microeconomic Incentives**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

How key economic principles affect business decision making. Students consider how incentives play a role in the decisions. The effects of organizational and capital structure on decision making and employee efforts are examined.

#### **5852. Leveraging Digital Technologies**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Assessing the strategic uses and implications of digital technologies, with a focus on harnessing and managing information technologies in inter-organizational and market-related contexts for competitive advantage.

#### **5863. Managing Brand Value**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Focus on implementing the value proposition targeted to specific customers. Students use the marketing mix as a conceptual tool to structure thinking and make decisions around comprehensive strategy implementation related to product and service attributes and benefits, pricing, channels of distribution, and integrated communications platforms.

#### **5901. Executive Project**

Variable (1.5-3 credits). Prerequisite: Open only to Business Administration Executive MBA students. May be repeated for a maximum of three credits.

Students engage in a new business development opportunity. Students focus on idea inception, conduct a feasibility analysis using a comprehensive assessment framework, and develop implementation strategies.

#### **5933. Alternative Investments and Risk Management**

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

Concepts of risk management with specific attention to the structure of risk management, identifying risk types, assessing risk, mitigating risk, and capital adequacy. Students focus on

the key investment strategies used in alternative investments markets, i.e., hedge funds and private equity, and assess derivatives (puts and calls), forward and futures contracts, and swaps. They examine how these strategies can be used to speculate or hedge particular risks.

### 5993. Sustainable Competitive Strategy

1.5 credits. Prerequisite: Open only to Business Administration Executive MBA students.

How to defend businesses against competitive challenges and environmental change while maintaining high ethical standards. Students focus on game theory, sustainability, and temporal tradeoffs to understand the effects of managerial choices on competitors, internal stakeholders, society and the future performance of the firm.

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## Field Education (FED)

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### 5301. Field Education Seminar I

Zero credits.

This seminar helps students prepare for and make optimum use of their field education experience. Topics include the roles and responsibilities of the student within the agency setting, exploration and development of learning contracts, and the educational assessment of self as a learner in the profession. The seminar is used to identify issues that arise in the field and ways to deal with them. Required course for students in the M.S.W. program.

### 5302. Field Seminar II

One credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

This seminar helps students prepare for and make optimum use of their field education experience. Areas of seminar content include such topics as the roles and responsibilities of the student within the agency setting, exploration and development of learning contracts, and the educational assessment of self as a learner in the profession. The seminar identifies issues that arise in the field and ways to deal with them. Required course for students in the M.S.W. program.

### 5310. Field Education Seminar III

Zero credits. Prerequisite: Open only to M.S.W. students. Corequisite: POPR 5353 or CORG 5353 or ADMN 5353 or GRWK 5353 or CSWK 5353.

This seminar helps students prepare for and make optimum use of their field education experience. Topics include the roles and responsibilities of the student within the agency setting, exploration and development of learning contracts, and the educational assessment of self as a learner in the profession. The seminar is used to identify issues that arise in the field and ways to deal with them. Required course for students in the M.S.W. Program.

### 5311. Field Education Seminar IV

One credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

This seminar helps students prepare for and make optimum use of their field education experience. Areas of seminar content include such topics as the roles and responsibilities of the student, field instructor and faculty advisor, exploration and development of the learning

contract, and the educational assessment of self as a learner in the profession. Required course for students in the M.S.W. program.

### 5340. Field Practicum Extension

Variable (1-5) credits. Prerequisite: Department consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Field practicum extension of hours.

### 5350. Field Education Seminar V

One credit. Prerequisite: FED 5302 and 5352; open only to M.S.W. students. Corequisite: CORG 5355 or IGFP 5355. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

This seminar helps students prepare for and make optimum use of their field education experience. Topics include the roles and responsibilities of the student within the agency setting, exploration and development of learning contracts, and the educational assessment of self as a learner in the profession. The seminar is used to identify issues that arise in the field and ways to deal with them. Required course for students in the M.S.W. program completing a Block Field Placement.

### 5351. Field Education Foundation I

Four credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Teaches students basic skills in social work practice with systems of all sizes including individuals, groups, organizations, and communities. This field experience course provides the foundation for the development of advanced skills in specific social work methods in advanced field experiences. Required course for students in the M.S.W. program.

### 5352. Field Education Foundation II

Four credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Continues to develop basic skills in social work practice with systems of all sizes, while adding increased emphasis on the students' development of skills in the students' major method. Required course for students in the M.S.W. program.

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## Finance (FNCE)

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### 5101. Financial Management

Three credits. Prerequisite: Open only to MBA students. Not open to students who have passed FNCE 5812.

Overview of techniques for effectively studying financial decisions and their impact on the company. Covers the basic concepts and tools necessary to understand the financial decision-making process. The fundamental issues of timing and uncertainty are integrated into the problem of asset valuation. Financial analysis models for determining appropriate sources of capital and effective use of long term and short-term assets are discussed.

### 5151. Introduction to Economic Markets

Three credits. Prerequisite: Open only to MBA students. Not open to students who have passed BADM 5170.

Provides a foundation in the economics of markets, with particular application to financial markets and the role of information. Specific topics include the following: (1) the basic principles of supply, demand, profit maximization, price determination, international trade, and exchange rates; (2) the basic structure of modern, global financial markets, as an application of the basic economic principles; (3) the use of information and information technology in financial markets, including use of the internet, Bloomberg, Dow Jones and other computerized sources of information; and (4) a review of the "efficient market hypothesis."

### 5181. Fundamentals of Financial Management

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open to students who have passed BLAW 5182.

Students gain tools and frameworks to analyze financial decisions based on principles of modern financial theory. Covers concepts such as discounted cash flow techniques, and its applications to valuation of common stock and bonds and lease vs. buy decisions. The time value of money is examined for both personal financial planning and business applications, and is used to value financial instruments, including common stock and bonds.

### 5182. Capital Budgeting and Corporate Financial Policy

1.5 credits. Corequisite: FNCE 5181.

Applying the tools and techniques of the time value of money framework to capital budgeting issues and corporate financial policy. They focus on corporate capital budgeting and valuation, investment decisions under uncertainty, market efficiency, and corporate financial policy including financing and dividend decisions. Students evaluate capital investments with a focus on how companies analyze the risk associated with future cash flows and how that risk is incorporated in the required rates of return, as well as how financing choices (stocks and bond issues) and payout policy affect the cost of capital of large projects. Students apply two widely used models, the Capital Asset Pricing Model (CAPM) and the Weighted Average Cost of Capital (WACC) to capital budgeting problems.

### 5202. Investment and Security Analysis

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

A rigorous foundation in risk/return analysis, asset valuation, the use of derivatives, and financial engineering techniques in risk management and overall portfolio management. Information technology is applied, including computerized financial modeling and asset management software.

### 5205. Global Financial Management

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

An exploration of global finance topics such as 1) international trade, 2) balance of payments, 3) exchange rate determination, 4) currency exposure, and 5) the cost of capital in global financial markets. Information technology is applied.

### 5206. Financial Institutions: Management and Capital Markets

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Investigation of the structure financial services companies (banks, insurance companies, securities firms, and so forth). Emphasis is on the tools used by these firms to compete to provide basic financial services like pooling resources, managing risk, transferring economic resources, pricing information and clearing and settling payments. Financial services product development and the role of information technology in financial services, including software and data.

#### **5209. Corporate Finance**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

A markets-oriented approach to corporate finance issues, especially capital structure and dividend policy. Modern concepts of agency theory and asymmetric information are integrated.

#### **5310. Introduction to U.S. Capital Markets**

Three credits. Not open to students who have passed FNCE 5894 when taught as Introduction to U.S. Capital Markets.

Designed for students who have limited experience and knowledge about the U.S. capital markets. Students will learn about the U.S. capital markets through classroom lectures, assignments, and corporate visits/presentations.

#### **5312. Financial Institutions - A Risk Management Approach**

Three credits. Prerequisite: Department consent.

Sources of risk and management of risk through diversification, hedging and gearing, Value at Risk (VAR), Risk Management System and Basel II Accord, as well as the measurement of market risk, interest rate risk, credit risk, and other risks are addressed in this course.

#### **5313. Financial Risk Modeling I**

Three credits. Prerequisite: Department consent.

The mathematical foundation for modeling financial risk as well as key concepts in algebra, statistics, calculus, time series and econometrics principles with applications to modeling risk management as a dynamic process over time.

#### **5321. Financial Risk Modeling II**

Three credits. Prerequisite: Department consent.

A background in building advanced financial models, including lattice models, numerical methods, and Monte Carlo simulation; programming techniques to value complex derivatives and portfolios; and analyses of financial risk problems with Excel, VBA, and higher level programming languages.

#### **5322. Financial Risk Management I - Equity Markets**

Three credits. Prerequisite: Department consent.

Strategies for security selection and asset allocation and evidence on returns and volatility, trade-to-trade equity price behavior, trading volume and patterns, financial risks and optimal allocation of funds. Students will use pricing and equity derivatives in risk management as well as exotic options in equity-linked and interest rate-linked products and strategies.

#### **5323. Advanced Issues and Applications in Risk Management I**

Three credits. Prerequisite: Department consent.

First part of a three-part seminar series on applications in risk management. Introduces students to the current practice in the application

of various risk management tools and techniques to real life situations. Material will be delivered through several sections, and include papers and articles written by both academics and practitioners.

#### **5331. Financial Risk Modeling III**

Three credits. Prerequisite: Department consent.

The application of advanced estimation and forecasting techniques including multivariate and time series models (ARIMA) and maximum likelihood estimation to risk management, and advanced VAR topics, including computing and implementing VAR management systems, extensions and limitations of VAR (IVAR, DVAR), and stress testing.

#### **5332. Financial Risk Management II - Fixed Income Markets**

Three credits. Prerequisite: Department consent.

Bond fundamentals and risk, models of term structure, the use of interest rate derivative in hedging interest rate risk, the use of mortgage-backed and other asset-backed securities (MBS, CMBS), and other debt instruments (CDOs, CLOs etc.) to manage credit and cash flow risks, in addition to valuation and trading strategies of pooled assets and derivative bonds using Monte Carlo and option pricing techniques.

#### **5333. Advanced Issues and Applications in Risk Management II**

Three credits. Prerequisite: Department consent.

Second in a three part series; a continuation of Advanced Issues and Applications in Risk Management I. Examines the financial regulatory environment and explores advanced issues and strategies in financial risk management.

#### **5341. Financial Risk Management III - Advanced Topics**

Three credits. Prerequisite: Department consent.

Pricing, measurement, and management of credit risk; credit risk modeling; use of credit derivatives to manage and control credit risk; building and managing portfolios, including long/short, and market neutral strategies; measurement of credit risk, including Actuarial, Merton, and Copula function; and portfolio construction, performance evaluation, asset allocation, and portfolio risk management (VAR, Hedging, Portfolio insurance).

#### **5342. Internal Control Risk - Valuation and Analysis Issues**

Three credits. Prerequisite: Department consent.

Accounting requirements associated with asset valuation and income recognition of complex portfolios that utilize advanced hedging techniques. Analyzing an organization's control environment and processes within COSO and SOX frameworks and the control practices that organizations use to help ensure the integrity of information provided by its accounting systems. Tax related issues and Basel II are also discussed.

#### **5343. Legal and Ethical Issues in Financial Risk Management**

Three credits. Prerequisite: Department consent.

An introduction to the federal laws regulating financial products and the internal controls necessary to comply with those laws. The federal regulation of securities and derivatives and the market participants engaged in those businesses. Participants study safety and soundness regulation of other major financial institutions, including

commercial banks, bank holding companies, and insurance underwriters. Examination of the compliance activities and internal controls that financial firms need to maintain to comply with federal law particularly the Sarbanes-Oxley Act. Includes an overview of new developments in financial regulation and compliance.

#### **5344. Advanced Issues and Applications in Risk Management III**

Three credits. Not open for credit to students who have passed FNCE 5894 when taught as Capstone in Financial Risk Management.

A review of the Financial Risk Management program. The experiential learning requirement, which is graded pass-fail, must be completed by the end of this Capstone course. Reviews the accounting requirements associated with asset valuation and income recognition of complex portfolios that utilize advanced hedging techniques. Analyzes an organization's control environment and processes within COSO and SOX frameworks and examines the control practices that organizations use to help ensure the integrity of information provided by its accounting systems. Tax-related issues and Basel II are also discussed.

#### **5351. Excel Visual Basic Applications in Financial Risk Management**

Three credits.

The advanced knowledge of financial risk management to build risk measurement and management tools by using Excel VBA. Course assumes prior knowledge of the VBA language. It provides an advanced learning forum for students to develop specific applications on their own. These deliverable risk management applications are graded.

#### **5352. Financial Programming and Modeling**

Three credits.

The use of MATLAB, R, and SAS for financial programming and modeling. Students pick up materials such as programming basics, SQL, database operations, file operations, graphical user interface design, object-oriented programming, XML, Component Object Model (COM) client and server, and application programming interface (API). Fundamental concepts are reviewed. Students learn modeling techniques such as Monte-Carlo simulation, binomial and trinomial trees, Black-Scholes, finite difference methods, constrained and unconstrained optimization, linear and non-linear programming, heuristic optimization, mean-variance, Value at Risk, data envelopment analysis (DEA), and data mining techniques applied in risk management, and apply these in financial contexts. Construction of various applications, for example portfolio optimization with live data from the internet using various methods, option pricing using Monte-Carlo, binomial trees, Black-Scholes, asset pricing models, capital budgeting, efficiency evaluation, finding betas of stocks, risk evaluation using data mining techniques, etc., across several programming languages.

#### **5353. Enterprise Risk Management (ERM)**

Three credits.

A real world approach for students and real-world professionals to use in determining how business risk can affect top priority business strategies and how to develop action plans for

addressing those risks through ERM. The steps necessary to achieve an effective ERM process through a unique methodology for identifying and prioritizing risks across business functions. An initial set of specific risks many functions may currently face. Includes tools, sample reports and case studies providing a practical guide for implementing ERM. Links ERM to the corporate strategy which is well illustrated through case studies. There will be a detailed discussion of the value of ERM to the enterprise and its various stakeholders.

#### **5408. Valuation of Financial Assets**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Developing models for asset allocation, and security selection to construct a diversified portfolio. Analysis of industry segments, and valuation of common stocks and bonds. Topics include analysis of business models, measurement of risk and cost of capital, valuation of common stocks, and valuation and measurement of risk of bonds and bond funds. Preparation of analysts' reports is an integral part of the course.

#### **5409. Advanced Valuation and Portfolio Management**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Starts with performance measurement, and then discusses various trading and risk management strategies, and concludes with a discussion of the impact of accounting process, and corporate governance on valuation. Technical analysis is briefly discussed at the end. Delivered primarily through discussion of cases.

#### **5410. Fund Management I**

Variable (1-3) credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students; instructor consent required. Corequisite: FNCE 5202.

First part of a two-part Fund Management course. Develops the objectives and goals, the process, and the procedure for execution for management of funds in conformity with the SMF Prospectus. Trains students in the art of asset allocation, security selection, portfolio construction, risk management, preparing analysts' reports for trade recommendations, monitoring of positions, and preparing reports for presentation to the IAB.

#### **5411. Fund Management II**

Variable (1-3) credits. Prerequisite: FNCE 5101 or FNCE 5182 and FNCE 5202; open only to MBA students. Instructor consent required.

This course is the second part of a two-part Fund Management course. In addition to all the activities in the first part during Fall, this course focuses on portfolio management, performance evaluation, attribution analysis, development of various trading and risk management strategies, and technical analysis. Students prepare the final annual report for presentation to the UConn Foundation.

#### **5504. Options and Futures**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Analysis and valuation of speculative securities including options and futures with emphasis on their use for hedging and speculative motives. Major valuation models are discussed and applications of

contingent claim valuation framework to corporate finance problems are also explored.

#### **5512. Fixed Income Instruments and Markets**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Examines contemporary portfolio management of fixed income institutional investors, issuers, and broker-dealers. Assesses current practice and presents a theoretical framework for anticipating change. Coverage includes pricing, assessment of return and risk, and the development of overall strategies, for these markets: government, corporate, municipal, and international bonds; mortgage-related and other asset-backed securities; and derivative securities including futures, options, swaps, and other interest rate contracts.

#### **5513. Advanced Corporate Finance: Capital Investment Finance**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Dynamic capital budgeting; applies corporate finance theory to the real-world problems that financial analysts face every day, integrating theory and practice, facilitated through the use of simulation analysis. These tools include both an understanding of the theoretical underpinnings of sound capital budgeting techniques and a mastery of the technology necessary to practically implement this knowledge in a real-world setting.

#### **5532. Real Estate Investment and Portfolio Management**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Overview of real estate investment decision-making. Topics include: risk-return analysis of alternative types of real estate investments; leases, operating costs, and tax consequences; valuation techniques, including discounted cash flow and option pricing; real estate portfolio management; and alternative forms of equity securitization such as real estate investment trusts.

#### **5533. Real Estate Capital Markets**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Structure and operation of the mortgage market. Topics include the identification, measurement and management of risk from the perspective of borrower, lender, and investor. Stresses the integration of the real estate debt markets with the global capital market, and considers the role and impact of mortgage-backed securities for residential and commercial real estate lending.

#### **5534. The Internet and Information Systems Applied to Real Estate**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Specialized information technology is now available for all segments of the real estate industry. For example, investment firms are particularly interested in information technology that helps them monitor, understand, and manage risks associated with mortgage-backed securities. Database management systems and geographic information systems (GIS) give the decision-maker unprecedented power to manage data and analyze risks. The Internet opens up vast new sources of timely information. This course stresses the use of GIS and of the Internet. Students will gain hands-

on experience with these tools through projects that are organized around business problems.

#### **5610. Personal Financial Planning**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

For the professional working in the area of financial services as well as for one's personal planning. It is the application of finance theory to the individual and family. This integrated approach covers lifetime cash flows, asset accumulation and allocation, debt management, retirement planning, and risk management.

#### **5611. Financial Modeling**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

A hands-on use of computerized decision aids to analyze a variety of financial problems. Applications will be drawn from corporate financial planning, modern portfolio theory, options pricing, dynamic trading, and so forth. No computer experience is required; this course will help students develop the necessary programming skills to build fairly sophisticated models.

#### **5630. Real Estate: A Personal Investment Perspective**

Three credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent.

Real estate is a major component of household wealth. Important household real estate decisions include, for example, where to buy a house; renting versus owning a home; choosing between alternative mortgage instruments; understanding the house purchase transaction; and the risks and returns of real estate investing. This course surveys the fundamentals of real estate from a personal investment perspective.

#### **5894. Seminar**

Variable (1-3) credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent. May be repeated for a maximum of 12 credits.

Investigation and discussion of special topics in finance, risk and insurance and/or real estate and urban economic studies.

#### **5895. Special Topics in Finance**

Variable (1-3) credits. Prerequisite: FNCE 5101 or 5182; open only to MBA students, others with consent. Instructor consent required. May be repeated for a maximum of 12 credits.

Faculty-student interaction on a one-to-one basis involving independent study of specific areas of finance, risk and insurance, and/or real estate and urban economic studies. Emphasis, selected by the student, may be on theoretical or applied aspects. A written report is required.

#### **6200. Investigation of Special Topics**

Variable (1-2) credits. Prerequisite: FNCE 5508. May be repeated for a maximum of 12 credits.

#### **6201. Introduction to Finance Theory and Evidence**

Three credits. Prerequisite: Instructor consent.

Efficient market hypothesis, utility theory, portfolio theory, CAPM, arbitrage pricing theory, option pricing, capital structure, tax theory, capital budgeting under uncertainty, and current empirical studies.

**6202. Corporate and Institutional Finance**

Three credits. Prerequisite: FNCE 5508; instructor consent required.

Topics include information asymmetry, agency, internal capital markets, governance, market microstructure, moral hazard / adverse selection. Concepts are applied in both corporate and financial institution settings.

**6203. Theory of Financial Markets and Valuation**

Three credits. Prerequisite: Instructor consent.

Fundamental pricing theorems, state preference theory, martingale pricing, dominance, spanning and arbitrage restrictions, consumption models, and continuous-time approaches to asset pricing, interest rate models, and derivatives pricing.

**6204. Empirical Methods in Finance Research**

Three credits. Prerequisite: FNCE 5508; instructor consent required.

Topics include predictability of asset prices, time series models of market microstructure, event study methodology, tests of asset pricing models and derivative pricing models, market efficiency, volatility of asset returns, and term structure interest rates.

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## French (FREN)

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**5306. The Later French Enlightenment**

Three credits.

**5307. Problems in French Literature or Philology**

Variable (1-3) credits. May be repeated for a maximum of 12 credits.

**5311. Aesthetic Trends in Twentieth-Century French Literature**

Three credits. May be repeated for a maximum of 12 credits.

**5353. Old French Literature**

Three credits.

**5357. The French Novel in the Eighteenth Century**

Three credits.

**5361. French Poetry in the Second Half of the Nineteenth Century**

Three credits.

**5362. French Contemporary Poetry**

Three credits.

**5363. Topics in Nineteenth-Century French Literature**

Three credits. Prerequisite: Open only to graduate students in Literatures, Cultures and Languages; others with instructor consent. May be repeated for up to nine credits with a change of topic.

Explores the problems of genre, criticism, theory, and material conditions of the literary production of nineteenth-century France.

**5365. Topics in Nineteenth-Century French Media**

Three credits. Prerequisite: Open only to graduate students in Literatures, Cultures and Languages; others with instructor consent. May be repeated for up to nine credits with a change of topic.

Explores visual, spectacle-oriented, and print media; the commercial and technological

dimensions of nineteenth-century media production, genre, advertising, and information theory; and the ways in which these elements challenge traditional literary categories.

**5369. The French Novel in the First Half of the Nineteenth Century**

Three credits.

Stendhal, Balzac, and the romantic novelists.

**5370. The French Novel in the Second Half of the Nineteenth Century**

Three credits.

Flaubert, Zola, and their contemporaries.

**5373. The French Contemporary Novel**

Three credits.

**5374. Narrative Forms in 20th- and 21st-Century French Literature**

Three credits. Prerequisite: Open only to graduate students in Literatures, Cultures and Languages; others with consent. May be repeated with a change of topic for up to nine credits.

Narrative in 20th- and 21st-century literature, including its criticism and theory, in traditional and nontraditional literary forms.

**5376. The Prose of the French Renaissance**

Three credits.

**5377. The Poetry of the French Renaissance**

Three credits.

**5380. Seminar in Francophone Literature**

Three credits. May be repeated for credit with change of topic.

The study of the literature from the French-speaking world outside of France (Quebec, the Antilles, West Africa, the Maghreb) against the background of colonial and post-colonial history.

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## Geography (GEOG)

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**5000. Research Design**

Three credits.

A survey of research methods in geography. Topics include spatial sampling, hypothesis construction and testing and geographic modelling.

**5010. Geography Proseminar**

One credit. Prerequisite: Open only to Geography graduate students.

Presentation by geography faculty of current research topics.

**5100. Location Analysis**

Three credits.

Issues and approaches in location analysis. Topics include location theory and models; representation issues; use of geographic information systems (GIS) for data preparation, analysis and display; evaluation of service areas; land use allocation; accessibility and locational conflict; and implications for planning and public policy.

**5110. Regional Development and Policy**

Three credits. Prerequisite: Instructor consent.

A study of theory and practice in regional development and planning. Emphasis on evaluation of regional problems and public policies designed to resolve them, with a primary focus on the United States.

**5130. GIS in Transportation**

Three credits. Prerequisite: Open only to Geography graduate students.

Discussion of the uses of Geographic Information Systems (GIS) for transportation rate establishment, for visualizing the results of transportation models for predicting flows, for exploring the impact of transportation on the location of economic activities, and for the planning of transportation facilities in cities.

**5140. Geographical Analysis of Social Issues**

Three credits. May be repeated for a maximum of six credits.

Focus on geographical perspectives toward research on selected social issues, with an emphasis on methods of behavioral analysis and relevant social geographical concepts such as social space, activity spaces and time-space budgets, and diffusion.

**5150. Visualization in Geographic Information Systems**

Three credits.

Design of spatial data displays and computer generated maps.

**5220. Geography of Sustainable Development**

Three credits.

Conceptualizing international development; understanding theories, strategies and ideologies of development; and use of case studies to understand development in practice. Emphasis placed on the concept of sustainable development and sustainability, grassroots-driven approaches to development, the role of women, and geographic explanations as to how and why uneven development has occurred.

**5230. Advanced GIS for Remote Sensing for Geoscience Applications**

(Also offered as GSCI 5230.) Three credits. Not open to students who have passed GEOG 4520.

Research methods for using Geographic Information Systems, remote sensing, and image interpretation to investigate problems in geoscience. Includes research techniques for data acquisition, processing and analysis of Digital Elevation Models and satellite imagery. Geologic materials, processes, landforms and landscapes.

**5290. Advanced Urban Geography**

Three credits. May be repeated for a maximum of six credits.

Analysis of social and economic patterns within urban areas, with emphasis on individualized research. The implications for planning are stressed.

**5310. Advanced Fluvial Geomorphology**

Three credits. Not open for credit to students who have passed GEOG 3310.

Research methods for analyzing fluvial forms and processes. Theoretical discussion of factors controlling open-channel flow, sediment transport, channel morphology, adjustments of rivers to environmental changes and human impacts. River management and restoration strategies. Requires one weekend field trip.

**5390. Advanced Physical Geography**

Three credits. May be repeated for a total of six credits.

Problems involving the application of physical processes in our changing environment.

**5500. Fundamentals of Geographic Information Science**

Three credits.

An introduction to the theory and methods for representing, acquiring, storing, manipulating, displaying, and analyzing geographic features in relation to the surface of the earth.

**5505. Remote Sensing of Marine Geography**

Three credits.

Introduction to remote sensing applications in oceans and seas. Applications include image analysis of sea surface temperature, winds, altimetry, sea ice, chlorophyll, primary productivity, and bathymetry. Graduate section includes individualized projects.

**5510. Application Issues in Geographic Information Systems**

Three credits. Recommended preparation: GEOG 5500.

Operational and management issues in geographic information systems (GIS). Implementation of traditional planning and management theories and techniques in GIS. Topics include problems of data exchange standards, implementation of GIS in an institutional setting including benchmarking a GIS, applications of GIS in various fields, social impacts and legal aspects of GIS. Practical work includes analytical exercises using GIS culminating in an application project.

**5515. Web GIS**

Three credits. Prerequisite: Instructor consent.

Introduction to Internet GIS. The basics of system architecture, geospatial web services, mashups, key elements of mobile GIS solutions, the functionality of geoportals and web technologies, web mapping interoperability using universal data standards such as OGC (Open Geospatial Consortium) web services, and the current state of e-business and e-government web mapping interests.

**5520. GIS Modeling of the Urban Environment**

Three credits. Prerequisite: Instructor consent.

Survey of GIS methods and spatial analysis for studying spatial patterns of land use and human activity in an urban environment.

**5530. GIS Applications in Health Research**

Three credits.

Survey of GIS methods for health research, health care policy making, and planning.

**5560. GIS and Environmental Geography**

Three credits. Recommended preparation: GEOG 5500.

Applicability of Geographic Information Systems to solve environmental problems. Case studies address environmental assessment and monitoring, analysis and modeling, planning and management.

**5600. Spatial Data Analysis**

Three credits. Prerequisite: Instructor consent.

Univariate statistics focused on the use of spatial statistics, including geostatistics in geographical research. Problems specific to spatial data analysis are addressed.

**5610. Spatial Statistics and Modeling**

Three credits. Prerequisite: GEOG 5600.

Advanced study in the methods and practice of multidimensional statistics and spatial modeling.

**5620. Computer Applications in Spatial Analysis**

Three credits.

Advanced seminar in the design of Geographic Information Systems software for solving problems in spatial analysis.

**5700. Contemporary Europe: A Geography**

Three credits.

An introduction to the peoples, countries, and landscapes of Europe (excluding the republics of the former U.S.S.R.). Emphasis on the economic, political, and social forces both maintaining national identities and shaping a united Europe.

**5810. Special Problems in Geography**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

**5890. Internship in Geography**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

A fieldwork internship program under the direction and supervision of the geography staff. Students will be placed in agencies or industries where their academic training will be applied. One 8-hour work day per week (or its equivalent) for the host agency during the course of the semester will be necessary for three academic credits. A written report will be required.

**6000. Themes in Geographic Thought**

Three credits.

Examination of the historical development of geography since the early nineteenth century. Emphasis on the last century of intellectual developments that have led to the emergence of contemporary geography as a research discipline.

**6800. Practicum in College Teaching in Geography**

One credit. Prerequisite: Open only to Geography graduate students; instructor consent required. May be repeated for a maximum of three credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Guided development of college-level instruction. Drafting of course objectives, selection of texts, development of course and lecture outlines, selection of grading mechanisms, and incorporating feedback for improvement of instruction.

**6810. Advanced Topics in Spatial Analysis**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

**6820. Advanced Topics in Regional Analysis**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

**6830. Advanced Topics in Population Geography**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

**6840. Advanced Topics in Urban Geography**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

**6850. Advanced Topics in Geography of Public Policy**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

**6860. Advanced Topics in Economic Geography**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

**6870. Advanced Topics in Physical Geography**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

**6880. Advanced Topics in Environmental Geography**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

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**Geoscience (GSCI)**

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**5000. Geoscience Core Course**

Three credits. May be repeated for a maximum of six credits.

Exposes students to a solid background in a variety of topics related to integrative geosciences, emphasizing interdisciplinarity. Development of speaking skills through oral presentations, and writing skills through preparation and defense of large, interdisciplinary grant proposals. Required of all first year graduate students in Geosciences.

**5050. Special Problems in Geology**

Variable (1-6) credits. Prerequisite: Department consent. May be repeated for credit up to six times with a change of content.

Advanced study and research in geology.

**5110. Sediment Transport**

Three credits.

The mechanics of sediment transport with particular emphasis on the processes governing transport in coastal and estuarine areas. Initiation of motion for cohesive and noncohesive materials, bed and suspended load transport, bed forms, sediment-flow interactions modeling considerations.

**5210. Glacial Processes and Materials**

Three credits.

Reconstruction of former glaciers and the interactive processes leading to the character and distribution of unconsolidated surface materials in glaciated regions. Techniques for interpreting subsurface unconsolidated materials.

**5230. Advanced GIS for Remote Sensing for Geoscience Applications**

(Also offered as GEOG 5230.) Three credits. Not open to students who have passed GEOG 4520.

Research methods for using Geographic Information Systems, remote sensing, and image interpretation to investigate problems in geoscience. Includes research techniques for data acquisition, processing and analysis of Digital Elevation Models and satellite imagery. Geologic materials, processes, landforms and landscapes.

**5320. Advanced Plate Tectonics**

Three credits.

Introduces students to techniques used in analyzing plate motions on a sphere, including poles of rotation and instantaneous and finite motions. The course integrates geologic data and analytical techniques with a rigorous understanding

of plate motions and provides students with a global understanding and appreciation of the Earth.

#### **5510. Applied Geophysics for Geologists and Engineers**

Three credits.

Introductory survey of surface and borehole geophysical methods and their application to hydrogeologic, environmental monitoring, and geotechnical engineering studies. Laboratory involves geophysical field measurement, data reduction and geologic interpretation.

#### **5520. Exploring and Engineering Seismology**

Three credits.

Theory of elasticity applied to wave propagation: equations of motion; reflection and refraction of elastic waves; velocity analysis and fundamental petrophysics; and principles of detecting subsurface interfaces and structures.

#### **5530. Applied and Environmental Geophysics**

Three credits. Prerequisite: Instructor consent.

Potential theory (gravity, static electricity and magnetic fields), electromagnetic coupling, Maxwell's equations; electromagnetic wave propagation; principles of detection of subsurface interface and structures by geophysical methods.

#### **5550. Physics of the Earth**

Three credits.

The composition, structure, and dynamics of the earth's core, mantle, and crust inferred from observations of seismology, geomagnetism, and heat flow.

#### **5560. Fundamentals of Planetary Science**

Three credits.

Evolution of the solar system, celestial mechanics, tidal friction, internal composition of planets, black-body radiation, planetary atmospheres.

#### **5710. Advanced Hydrogeology**

Three credits.

Transport processes in groundwater systems. Mathematical methods in groundwater hydrology. Water quality and resource evaluation.

#### **5720. Groundwater Modeling**

Three credits.

Numerical techniques for modeling flow and contaminant transport in groundwater systems. Model design, calibration, visualization, verification and sensitivity analysis. Application to field sites.

#### **5790. Field Methods in Hydrogeology**

Variable (1-6) credits. May be repeated for a maximum of six credits.

Field methods associated with ground water and contamination assessments.

#### **5850. Paleoclimatology**

Three credits. Prerequisite: Open to graduate students only. Not open to students who have passed GSCI 4850.

Introduction to the geological evidence, research methods, and hypotheses associated with major climatic events in Earth's history. Includes a climate-modeling project.

#### **6130. Seminar in Paleontology**

Variable (1-6) credits. Prerequisite: Department consent. May be repeated for a maximum of six credits with change of content.

Readings and discussions on recent advances in paleontology and paleobiology.

#### **6340. Seminar in Tectonics**

Three credits.

Readings and discussions of recent advances in tectonics.

#### **6520. Advanced Seismology**

Three credits. Prerequisite: MATH 5410; MATH 5411, which may be taken concurrently.

Elastic wave propagation in plane layered media; seismogram synthesis by ray parameter integration, ray approximations, and mode summation; earthquake source representations.

#### **6530. Geophysical Inverse Theory**

Three credits.

Fitting geophysical model parameters to data. Topics include model uniqueness, resolution, and error estimation.

#### **6540. Seminar in Geophysics**

Variable (1-6) credits. Prerequisite: Instructor consent.

Readings and discussions of recent advances in geophysics.

#### **6550. Special Topics in Geophysics**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

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## German (GERM)

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#### **5305. Studies in Germanic Philology and Linguistics**

Three credits. May be repeated for a maximum of 12 credits.

Study of a coherent body of material related to older Germanic languages; to diachronic or synchronic phonology, morphology, syntax, and lexicology of Germanic languages; or to other areas of theoretical or applied linguistics.

#### **5314. German Studies**

Three credits. May be repeated for a maximum of 12 credits.

Exploration of the field of German Studies as an "interdiscipline"; analysis of a coherent body of material drawn from the social sciences, humanities, natural sciences, or other fields that helps to illuminate the German-speaking world.

#### **5315. Topics in German Studies**

One credit. May be repeated for a maximum of four credits.

Focus on a particular theme (e.g. revolution, or family and society), approach (e.g. critical theory, or feminist interpretations), genre (e.g. lyric, or autobiographical essay), skill (e.g. research methodology) or other aspect of German studies.

#### **5332. Studies in German Literature II**

Three credits. May be repeated for a maximum of 12 credits.

Study of a coherent body of texts drawn from the period from approximately 1700 to 1890.

#### **5345. Studies in German Literature III**

Three credits. May be repeated for a maximum of 12 credits.

Study of a coherent body of texts drawn from the period from approximately 1890 to the present.

#### **5365. German Film Studies**

Three credits. May be repeated for a maximum of 12 credits.

Study of a coherent body of films and related materials (e.g. fiction, theory, reviews) organized to illuminate particular themes (e.g. representations of postwar Germany), relationships (e.g. between films and literature or film and social context), cinematic styles (e.g. Expressionism), etc.

#### **5376. Rhetoric and Writing**

Three credits. May be repeated for a maximum of 12 credits.

In-depth introduction to the rhetorical resources of the German language; extensive analysis of spoken and written language; application of knowledge in students' own writing and speaking.

#### **5377. Topics in Rhetoric and Writing**

One credit. May be repeated for a maximum of four credits.

#### **5378. Preparation for Certification of Proficiency in German**

Zero credits.

Development of students' proficiency in speaking, listening, reading and writing German in preparation for either the Mittelstufenprüfung or Oberstufenprüfung.

#### **5380. German Language Methodology**

Three credits. May be repeated for a maximum of 12 credits.

Exploration and analysis of a range of theories, issues, and problems in German instruction. Focus on the nature of language acquisition, methods, and implications for practice.

#### **5385. German Literary Criticism and Theory**

Three credits. May be repeated for a maximum of 12 credits.

Systematic study of literary criticism, including such topics as the contributions of particular critical approaches to the understanding of significant German-language literary works; the philosophies, implicit or explicit, underlying various critical approaches; and the German contribution to international critical discourse.

#### **5390. Independent Study**

Variable (1-6) credits. May be repeated for credit.

#### **6420. Seminar in Medieval Literature**

Three credits. May be repeated for a maximum of 12 credits.

#### **6450. Seminar in Nineteenth-Century Literature**

Three credits. May be repeated for a maximum of 12 credits.

#### **6460. Seminar in Twentieth-Century Literature**

Three credits. May be repeated for a maximum of 12 credits.

#### **6480. Investigation of Special Topics**

Variable (1-6) credits. May be repeated for a maximum of 12 credits.

## Graduate Program in Professional Studies (GPPS)

### 5300. Independent Study

Variable (1-3) credits. Prerequisite: Instructor consent.

Independent study in a topic related to the graduate program in Professional Studies as designated and approved by the instructor assigned to oversee and grade the project.

### 5301. Special Topics in Professional Studies

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits with a change of content.

The instructor assigned will designate the special topics related to the graduate program in Professional Studies and oversee and grade students' work in the course.

### 5325. Issues in Economic Development

Three credits.

Economic, social, and demographic change in those countries comprising the less wealthy regions of the South. It examines development from linear (neoclassical), structuralist (political economy), and other perspectives, and emphasizes relationships between "advanced" and "developing" countries within the context of the global economy. In addition to theoretical grounding, the course provides practice in preparing development profiles of individual countries.

### 5347. Program Evaluation

Three credits.

Application of the methods of science to the assessment of social programs. Here a social program refers to organized, goal-directed activities designed to address a social problem. The goal of this course is to provide you, the student, with enough skill that you are able to design and implement evaluations of programs. The extent to which you are able to do this without assistance reflects largely your familiarity with scientific methods. Some of the more technical forms of impact studies may require additional study, or assistance from consultants.

### 5352. Systemic Analysis

Three credits. Prerequisite: Instructor consent.

Provides students with a foundational understanding of the complex and dynamic relations between issues and the systems that cause them. Systemic analysis trains students to understand in the operational dynamics of the social and structural dimensions of a society or group.

### 5357. Quantitative Analysis

Three credits.

Develop skills necessary to understand and utilize research based on quantitative methods while building fundamental skills in quantitative analysis. Includes basic univariate statistics, bivariate statistics and basic multivariate statistics including basic analysis of variance and basic multiple regression analysis. Stresses the use of Microsoft Excel for performing statistical analysis.

### 5361. Strategic Staffing and Talent Management

Three credits.

This course presents the theoretical frameworks and practical tactics for the acquisition, deployment, and retention of the talent necessary to achieve the strategic and tactical objectives of the business. Topics will include strategic staffing, human resource planning, recruitment, assessment, selection decision-making strategies, succession planning and retention strategies. The importance of linking staffing and talent management to business strategies, objectives, and competitive challenges will be emphasized.

### 5389. MPS Internship

Three credits. Prerequisite: Open only to students enrolled in the Master of Professional Studies degree program; instructor consent required.

The internship will provide professional experience in the student's field of study in a private or public organization. Students will select the organization and specific internship position with the approval of the major advisor. Students will be expected to perform professional duties for a minimum of 160 hours during the semester. Prior to the beginning of the internship, student will develop a set of professional objectives for the internship experience. Students will maintain a log of experiences and activities during the internship. At the conclusion of the internship, students will write a paper evaluating the experience gained in light of the stated objectives.

### 5395. MPS Residency Program

Zero credits. Prerequisite or corequisite: GPPS 5397; instructor consent required.

The Master of Professional Studies (MPS) program requires students to complete a professional residency. The residency is a milestone towards the completion of the MPS degree. Consistent with the criteria for the MPS Capstone Project, each residency will be subject to the approval of the student's advisory committee. Appropriate residencies are those designed to: (a) provide students with an opportunity to develop a sense of affiliation and identification with the program and the university; (b) provide students with an opportunity for scholarly dialogue related to their capstone project; or (c) provide students with an opportunity for professional socialization by developing relationships with peers, faculty, and practitioners in the field. Examples of appropriate residencies include but are not limited to sessions at the Storrs campus, attendance and participation in approved regional national or international professional conferences.

### 5397. MPS Capstone Project

Variable (3-6) credits. Prerequisite: Open only to students enrolled in the Master of Professional Studies degree program; instructor consent required. May be repeated for a maximum of six credits.

Towards the end of the M.P.S. program, students will select, with faculty approval, a topic for a major project that demonstrates the student's ability to define, analyze, synthesize, evaluate, and recommend actions or solutions to deal with a major issue, problem, or opportunity within the field of study. Capstone Projects may include job-related field projects, integrative analyses of professional literature, and comprehensive project proposals for adoption by third parties. In all cases, the Capstone Project is intended to demonstrate an extensive understanding of the topic area selected,

the ability to develop and integrative and systemic analysis of a problem, and the ability to identify appropriate solutions and recommendations. A written report documenting all aspects of the project will be presented for faculty approval.

## Graduate School (GRAD)

### 5900. Special Topics in Graduate Education

Variable (1-3) credits. Prerequisite: Instructor consent.

Special topics in Graduate Education.

### 5910. Responsible Conduct in Research

One credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The core principles pertaining to responsible conduct in research are covered through extensive use of case studies, along with readings and classroom instruction. Different sections of the course utilize case studies that emphasize discipline-specific issues. Satisfactory completion is based on participation in the discussions and completion of a case study presentation.

### 5915. Summer Institute in College Instruction

Three credits. Prerequisite: Instructor consent.

Required core course of the Graduate Certificate Program in College Instruction, intended for doctoral students in the early stages of their graduate careers. Course objectives include competencies in instruction, classroom management, use of technology, assessment and evaluation, and other pedagogical best-practices. The course is offered in residential format over a two week period in May.

### 5930. Full-Time Directed Studies (Master's Level)

Three credits. Prerequisite: Open only to master's degree students, not doctoral students; Graduate School consent required. May be repeated for a maximum of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

This course denotes that the student is participating in a full-time internship, field work experience, or other course of off-campus study required as part of the student's Master's program. No other courses may be taken concurrently.

### 5940. Exchange Studies

Variable (1-9) credits. Prerequisite: Department consent. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

This course denotes that the student is participating in a full-time Graduate Exchange. No other courses may be taken concurrently.

### 5950. Master's Thesis Research

Variable (1-9) credits. Prerequisite: Open only to graduate students enrolled in a Plan A Master's Degree Program. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Associated with the research efforts of students pursuing a Plan A Master's Degree, and may be used to meet the nine-credit Master's research requirement.

**5960. Full-Time Master's Research**

Three credits. Prerequisite: Open only to graduate students enrolled in a Plan A Master's Degree Program; Graduate School consent required. May be repeated for a maximum of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

For students who have completed all courses on the plan of study and who are performing master's level research on a full-time basis. It may contribute to meeting the nine credit Master's research requirement. No other courses may be taken concurrently. In the summer, this is a 12-week (Summer 4) course. Since this course denotes a full time commitment, students may not hold graduate assistantships while taking this course.

**5997. Special Readings (Certificate)**

Zero credits.

This is a non-credit course for which certificate students must register in cases where their regular program of course work for credit has been interrupted and they are not otherwise registered.

**5998. Special Readings (Master's)**

Zero credits. To be used by master's students who are not enrolled in a thesis (Plan A) track. May be repeated.

This is a non-credit course for which master's degree students must register in cases where their regular program of course work for credit has been interrupted and they are not otherwise registered.

**5999. Thesis Preparation**

Zero credits. Prerequisite: Open only to graduate students enrolled in a Plan A Master's Degree Program. May be repeated.

This is a non-credit course to be used to maintain registered status by Plan A master's students who have completed their coursework and who are not registered for any other credit-bearing course.

**6000. Seminars in College Instruction**

One credit. May be repeated for a maximum of three credits.

Explores teaching skills that promote learning within a diverse student body in higher education. Hybrid sessions each address a specific topic in educational theory and practice. Students must complete five seminars of their choosing to fulfill the course requirement. Students will be self-directed in the completion of the course and are encouraged to select seminars that meet their professional interests, needs, and professional goals.

**6001. Fundamentals Teaching and Learning**

Two credits.

Introduction to instructional practices in higher education in general and undergraduate education in particular. Topics include instructional design and methods, evaluation and assessment, learning theory, pedagogical resources, and trends in higher education. This course is required for the Graduate Certificate in College Instruction.

**6002. Reflections on Teaching Practice**

Three credits.

Students in this seminar examine and discuss various issues of curriculum and teaching practice related to university level courses. Through a systematic process of problem-posing, reflection, and group feedback, students formulate practical solutions to problems occurring during curriculum

development, instruction, materials use, teacher-student interactions, course management, and program administration.

**6003. Advanced Issues Teaching and Learning**

Three credits.

This is a self-directed course providing graduate students interested in college teaching with the opportunity to design their own teaching portfolios and investigate and critique the syllabi and curriculum of other college teachers in order to reflect on their own pedagogical practices.

**6004. Practicum in College Instruction**

One credit.

The implementation and application of theory in college instruction. This 1-credit course is required for the Graduate Certificate in College Instruction for students who do not have any practical teaching experience in higher education. The practicum involves observation, mentoring, participation in classroom teaching, and planning/teaching in a higher education setting. Students and their coach will develop contracts that identify individualized learning outcomes of the practicum and assessment.

**6930. Full-Time Directed Studies (Doctoral Level)**

Three credits. Prerequisite: Open only to doctoral students; Graduate School consent required. May be repeated for a maximum of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Denotes that the student is participating in a full-time internship, field work experience, or other course of off-campus study required as part of the student's doctoral program. No other courses may be taken concurrently.

**6932. Directed Studies for MD/PhD**

One credit. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

For use of MD/PhD students at UConn Health to provide them with a credit benefit for their dual degree program. MD/PhD enrolling students may hold a graduate assistantship and take additional graduate courses, which allows continued integration of the graduate and medical school curricula in the first four semesters of the program. This 15-credit benefit is approved for UConn dual degree programs and is an important aspect of the MD/PhD program. Gives MD/PhD students the same 15-credit benefit as DMD/PhD students.

**6940. Exchange Studies**

Variable (1-9) credits. Prerequisite: Department consent. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

This course denotes that the student is participating in a full-time Graduate Exchange. No other courses may be taken concurrently.

**6950. Doctoral Dissertation Research**

Variable (1-9) credits. Prerequisite: Open only to doctoral students. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Associated with the research efforts of students pursuing a doctoral degree, and may be used to meet the fifteen-credit doctoral research requirement.

**6960. Full-Time Doctoral Research**

Three credits. Prerequisite: Open only to doctoral students; Graduate School consent required. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

To be used by those students who have completed all courses on the plan of study and who are performing doctoral level research on a full-time basis. It may contribute to meeting the 15-credit doctoral research requirement. No other courses may be taken concurrently. In the summer, this is a 12-week (Summer 4) course. Since this course denotes a full time commitment, students may not hold graduate assistantships while taking this course.

**6998. Special Readings (Doctoral)**

Zero credits. Prerequisite: Open only to doctoral students. May be repeated.

A non-credit course for which doctoral students must register in cases where their regular program of course work for credit has been interrupted and they are not otherwise registered.

**6999. Dissertation Preparation**

Zero credits. Prerequisite: Open only to doctoral students. May be repeated.

A non-credit course to be used to maintain registered status by doctoral students who have reached candidacy for the doctoral degree and who are not registered for any other credit-bearing course.

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## Healthcare Management and Insurance Studies (HCMI)

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**5221. Risk Management and Insurance**

Three credits.

Provides a basic understanding of various ways to deal with different types of risk. Fundamentals relating to life, property and casualty, and health insurance are discussed in that context. Enterprise risk management for corporations, financial risk management, and strategic policies to mitigate risk are also covered.

**5240. Health Care Organization and Management**

Three credits. Prerequisite: Open only to MBA students, others with consent.

Examines the nation's healthcare delivery system with overviews provided for each major sector of the health economy. The basic tools of economics and finance are employed to gain critical insights into the structure, conduct and performance of each of these sectors. Designed to accommodate both health care professionals and individuals from other business areas interested in learning more about the health care industry.

**5243. Health Care Economics**

Three credits. Prerequisite: HCMI 5240.

Demonstrates how various economic theories can be used to think about health care issues and takes a macro or industry perspective of various health care problems and policy questions. Students are provided with a set of economic tools to evaluate a theoretical or empirical argument relating to health or medical care. Culminates with an in-depth analysis of the structure, conduct, and performance of the markets for medical

insurance, physician services, hospital services, pharmaceutical products, and long-term care. Health care reform is also discussed.

#### **5549. Management of Long-Term Health Care Organizations**

Three credits. Not open to MBA students.

Examines administrative processes within the long-term health care facility including issues related to organizational effectiveness, financial management, the regulatory structure, operational procedures, policies and practices.

#### **5632. Internship in Health Care Management**

Variable (1-9) credits. Not open to MBA students. May be repeated for a maximum of nine credits.

Under the guidance of a qualified preceptor, the student participates in the administrative process in the long-term health care organizational structure. A project is required.

#### **5686. Health Insurance and Risk Management**

Three credits. Prerequisite: HCMI 5240.

A detailed overview of the purpose, structure, operation, and performance of the health insurance industry from the perspective of various stakeholders including insurance company owners, employers, individual consumers of health insurance services, and society. Emphasis is placed on individual and group health insurance products with respect to administration, selling and marketing, underwriting, pricing, and claims administration. Managed-care techniques, benefit-package design, and cost-sharing mechanisms are also evaluated and discussed.

#### **5687. Global Healthcare Systems**

Three credits. Prerequisite: HCMI 5240.

The examination and evaluation of diverse healthcare systems across the world. As part of this process, students will review the rationale that shapes the unique characteristics and attributes of different systems throughout the world and their associated strengths and weakness. From an organizational perspective, introduces models used for the provision of health care services within the framework of business management practices. May be used to satisfy the MBA Program at Hartford.

#### **5688. Risk Management and Quality across Borders**

Three credits. Prerequisite: HCMI 5240.

Examines the management of risk and quality within health care organizations and within different international settings. Within this framework, students are exposed to a number of different quality modes and study the relationship between risk management and quality.

#### **5891. Health Care Internship**

Variable (1-3) credits. Prerequisite: Instructor consent.

Under the guidance of a qualified preceptor, students are provided opportunities to study and analyze an organization's characteristics, functions, goals, strategies, and decision-making processes. Managerial skill is developed through the performance of administrative tasks and through participation in problem-solving processes. A research paper is required.

#### **5894. Seminar**

Variable (1-3) credits. Prerequisite: Open only to MBA students. Not open to students who

have passed BLAW 5182. May be repeated for a maximum of 12 credits.

Investigation and discussion of special topics in healthcare management.

#### **5895. Special Topics in Health Care Management**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Faculty-student interaction on a one-to-one basis involving independent study of specific areas of health care management. Emphasis, selected by the student, may be on theoretical or applied aspects. A written report is required.

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### **Hebrew and Judaic Studies (HEJS)**

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#### **5303. Religion of Ancient Israel**

Three credits.

Significant aspects of the religion of ancient Israel: The God-human relationship, the origins of good and evil, law and covenant, kingship, prophecy, ritual and morality, repentance and redemption. Taught in English.

#### **5316. Jewish Martyrdom in the Middle Ages**

Three credits.

Open to graduate students in Judaic Studies, Medieval Studies, Religion, English, Comparative Literature; others with consent of instructor. Jewish martyrdom from Late Antiquity through the Middle Ages, in text and practice. From rabbinic legends to medieval resistance.

#### **5325. Seminar on the Holocaust: Philosophical and Historical Issues**

Three credits. Prerequisite: At least six credits of Hebrew and Judaic Studies graduate courses.

Study of philosophical and historical issues related to the occurrence and analysis of the Holocaust.

#### **5326. Translating Scripture**

Three credits.

Open to graduate students in Judaic Studies, Comparative Literature and Cultural Studies, Medieval Studies, Classical and Mediterranean Studies, English, and Medieval Studies, others with permission; The history of Bible translations, from the ancient Aramaic and Greek versions of the Hebrew Scriptures to modern English translations.

#### **5351. Seminar on Modern Jewish Philosophy**

Three credits. Prerequisite: At least six credits of Hebrew and Judaic Studies graduate courses.

Study of the principal issues and figures in Jewish philosophy from the Enlightenment to the present. Topics considered include the nature (and possibility) of Jewish philosophy, the concepts of God, nature, and the world, the status of religious knowledge, law and practice, the concept of election in relation to the people and land of Israel. Thinkers to be considered and read include Moses Mendelssohn, Solomon Maimon, S.R. Hirsch, Hermann Cohen, Franz Rosenzweig, Ahad Ha'am, Martin Buber, Emanuel Levinas, A.J. Heschel, and Joseph Soloveitchik.

#### **5353. Modern European Jewish History**

Three credits. Prerequisite: Instructor consent.

Selected topics in Modern European Jewish History between the Enlightenment and the establishment of the State of Israel.

#### **5371. Jews, Turks, and Moors, in Early Modern Europe**

Three credits. Prerequisite: Open to graduate students in Judaic Studies; Literatures, Cultures, and Languages; English; History; and Medieval Studies; others by consent.

Examination of the varied representations of Jews, Muslims, and Africans in early modern culture through a study of travel narratives, poetry, religious texts, and dramatic literature.

#### **5390. Independent Study**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

#### **5397. Special Topics in Judaic Studies**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

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### **History (HIST)**

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#### **5101. Introduction to Historical Research**

Three credits. Prerequisite: Instructor consent.

Introduction to the sources and methods of professional historians. Finding primary sources (qualitative and quantitative), evaluating them for accuracy and usefulness, organizing data, and writing exercises based on the sources. Students must produce a proposal (fully annotated) for a major research paper to be written in the subsequent semester.

#### **5102. Historical Research and Writing**

Three credits. Prerequisite: Open to History M.A. and Ph.D. students; instructor consent required. May be repeated for a maximum of nine credits.

A research seminar for students in the M.A. and Ph.D. programs in history.

#### **5103. Teaching History**

Three credits. Prerequisite: Department consent.

A survey of the pedagogy and practice of history teaching, designed to prepare advanced graduate students for careers in colleges and universities, museums, and other educational settings. Seminar will explore the contemporary landscape of higher education; debates over the liberal arts and the place of history in the curriculum; diversity in the classroom; and challenges of designing syllabi, preparing and delivering lectures, leading discussions, advising and evaluating.

#### **5140. Introduction to Historical Museum Work I**

Three credits. Prerequisite: Instructor consent.

A study of historical agencies and museums. Laboratory work and field trips are included.

#### **5141. Introduction to Historical Museum Work II**

Three credits. Prerequisite: Instructor consent.

A study of historical agencies and museums. Laboratory work and field trips are included.

#### **5142. Administration of Archives and Manuscripts**

Three credits.

An overview of the history and development of the American archival profession, including basic archival theory and methodology. Emphasizes principles of collection, organization, and reference service for historical manuscripts and archives.

#### **5195. Special Topics in History**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

**5199. Independent Study in History**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

**5201. Theories of History**

Three credits. Prerequisite: Instructor consent.

The principles and problems underlying the study of history; and a survey of the history of historical writing and of various schools of historical interpretation.

**5218. Historical Conceptions of Race and Science**

Three credits. Prerequisite: Instructor consent.

Historical examination of the interplay between concepts of race and scientific naturalism as they emerged in the eighteenth, nineteenth, and twentieth centuries. Attention also paid to political and social contexts.

**5235. The Making of the African Diaspora**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

Theory and practice of African Diaspora history. Recent theoretical debates and cases of African Diaspora studies and history including: politics, culture, resistance; community formation; slavery; pan-Africanism; transnationalism; black internationalism; African and black consciousness; Diaspora theory; gender, race, and class analyses.

**5276. War and Revolution in the Twentieth Century**

Three credits. Prerequisite: Instructor consent.

**5316. Topics in Medieval History**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5370. Western Europe in the Fifteenth and Sixteenth Centuries**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5373. Europe in the Seventeenth Century**

Three credits. Prerequisite: Instructor consent.

**5374. Europe in the Eighteenth Century**

Three credits. Prerequisite: Instructor consent.

**5410. The French Revolution**

Three credits. Prerequisite: Instructor consent.

An intensive study of the intellectual, social, economic, political, and military events of the period and of their impact upon the world, as well as upon French history.

**5412. Nineteenth Century France**

Three credits. May be repeated for a maximum of nine credits.

**5423. State and Society in Europe since 1800**

Three credits.

Relationship between social change and state formation in Western Europe from c. 1800 to the mid-20th century; industrialization, class, social identities, nationalism, and imperialism.

**5424. Europe in the Nineteenth and Twentieth Centuries**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5456. Germany in the Nineteenth and Twentieth Centuries**

Three credits. Prerequisite: Instructor consent.

**5462. Topics in Modern British History**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5470. Topics in Italian History**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5475. Histories of the Body: European Perspectives since 1500**

Three credits. Prerequisite: Instructor consent.

Historical and interdisciplinary approaches to the study of the body and the European imagination since 1500. Topics include representations of health and illness; the body as a site of law and sovereign power; sexed bodies; the body in social and political theory; the government of life and death; race and ethnicity.

**5505. Gender in the Early Modern West**

Three credits.

Discussion of key works on gender, women, and sexuality, spanning the 1400s-1700s with a geographical focus mostly on Britain, continental Europe, and the Americas.

**5505. Gender in the Early Modern West**

Three credits.

Discussion of key works on gender, women, and sexuality, spanning the 1400's-1700's with a geographical focus mostly on Britain, continental Europe, and the Americas.

**5510. Topics in Colonial American History**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5515. The American Revolution**

Three credits. Prerequisite: Instructor consent.

**5520. United States in the Early National Period and the Age of Jackson, 1787-1840**

Three credits. Prerequisite: Instructor consent.

**5525. Society and Culture in the Civil War Era, 1830-1880**

Three credits. Prerequisite: Instructor consent.

The social, economic, political and cultural forces, including gender, race, and class, that shaped the Civil War and its aftermath.

**5530. United States in the Age of Reform, 1877-1924**

Three credits. Prerequisite: Instructor consent.

**5540. Topics in American Social and Cultural History, 1600-1876**

Three credits. Prerequisite: Instructor consent.

Major themes in the recent scholarship of social and cultural history: community and communication; family and gender; race, class, and industrialization; religion; and slavery.

**5543. Social Change in 19th Century America**

Three credits. Prerequisite: Instructor consent.

Major sources of social change in 19th-century United States, including legacy of the American Revolution; fate of Native America; rural society; slavery; industrialization; immigration; class formation; race; the impact of Civil War and Reconstruction.

**5544. American Land and Society**

Three credits. Prerequisite: Instructor consent.

Examines the historical literature on American ideas about landholding and agriculture from the

18th to the 20th century and their impact on society, culture, and the environment.

**5545. Topics in New England History**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5550. Topics in American Family History**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5555. Topics in the History of American Women**

(Also offered as WGSS 5333.) Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5560. Topics in the History of American Foreign Relations**

Three credits. Prerequisite: Instructor consent.

**5565. Topics in the History of Urban America**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5570. Topics in Black History**

Three credits. Prerequisite: Instructor consent.

**5575. American Maritime History**

Three credits. Prerequisite: Instructor consent.

A study of the development of American mercantile enterprise from colonial times and its relationship to American political, economic, and cultural history. The course includes lectures, readings, and extensive use of the facilities at Mystic Seaport. It is offered at Mystic Seaport under the joint auspices of the University of Connecticut and the Frank C. Munson Institute of American Maritime Studies.

**5576. Seminar in American Maritime Studies**

Three credits. Prerequisite: Instructor consent.

A seminar involving reading and research on selected topics in American maritime studies. Open only to students who have previously taken History 5575 or to advanced students who are concurrently enrolled in History 5575. This course is given at Mystic Seaport under joint auspices of the University of Connecticut and the Frank C. Munson Institute of American Maritime History.

**5610. Comparative Transnational Latina/o American History**

(Also offered as LLAS 5100.) Three credits. Prerequisite: Instructor consent.

Critical issues in diverse U.S. Latina/o histories and forces that contributed to the arrival of people of Latin American and Caribbean heritage to the United States. Topics include the epistemological origins and historiographical traditions of the field; U.S. empire; labor, migration, and diaspora; border formations; constructions of gender and sexuality; and comparative racialization.

**5621. Topics in Latin American History**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5622. The Historical Literature of Latin America**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

**5630. The Historical Development of the Caribbean**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

Theories and case studies of Caribbean history. Recent theoretical debates and cases of Caribbean history including economy, politics, culture, community formation; political mobilization; slavery and emancipation; nation and state formation; law; immigration and emigration; intellectual traditions; gender, race, and class analyses.

### **5836. Topics in Twentieth-Century China**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of nine credits.

### **5837. East Asian History**

Three credits. Prerequisite: Instructor consent.

Topics in modern Chinese and Japanese history with emphasis on Chinese thought and politics.

### **6000. American Studies: Methods and Major Texts**

(Also offered as AMST 6000 and ENGL 6800.) Three credits. Prerequisite: Open only to English, History, and Political Science graduate students.

Introduction to the methodologies and topics of American Studies through a survey of major texts in the field, past and present. Course also provides a history of the field.

### **6500. American Studies: Special Topics**

(Also offered as AMST 6500 and ENGL 6850.) Three credits. Prerequisite: Open only to English, History, and Political Science graduate students. May be repeated once for credit with a change in topic.

Detailed study of a specific topic in American cultural studies with an emphasis on developing skills in interdisciplinary research. Topics vary from semester to semester.

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## **Homeland Security Leadership (HSL)**

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### **5312. Intelligence for Homeland Security: Organizational and Policy Challenges**

Three credits.

Examines contemporaneous issues facing the intelligence community and its role in homeland security. Emphasis on critical thinking of issues related to policy development, implementation, and intelligence support to senior decision makers in the homeland security community. Students will have the opportunity to address policy, organizational and substantive issues pertaining to homeland security and intelligence; interact with each other, and author well researched papers.

### **5315. Contemporary Issues in Homeland Security Leadership**

Three credits.

Supports the overarching goals of the Homeland Security Leadership program by providing an intellectual framework for engaging in ongoing self-directed learning within the Homeland Security domain; developing a cadre of leaders across the Homeland Security continuum who share substantive skills in analysis, interpretation, policy development, and administration of approved policy; and to complement other more operationally oriented training programs.

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## **Human Behavior Elective (HBEL)**

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### **5300. Substance Abuse I: Intro to Alcohol and Other Drugs**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Examines the special issues and problems in dealing with alcohol and drug abuse. Focuses on: developing a conceptual framework of drug abuse and addiction; major classifications of drugs; examining high risk populations with an emphasis on their unique problems and needs; integrating knowledge with practice by giving careful consideration to treatment issues such as identification, assessment, referral, therapeutic strategies, treatment modalities and settings; providing information on the role of federal, state, and voluntary organizations which impact on prevention, education and treatment programs. Elective course for Substantive Area: Focused Area of Study on Mental Health and Substance Abuse in Social Work Practice.

### **5301. Substance Abuse II: Prevention and Treatment of Alcohol and Other Drug Abuse**

Three credits. Prerequisite: HBEL 5300; open only to students in the M.S.W. or STEP program.

Builds upon HBEL 5300, an overview of the various classes of drugs and the acute and chronic effects of drugs on human behavior and the body. Focuses on traditional and new intervention techniques that could be applied to social work practice. Provides knowledge of clinical applications and the empirical validation of effectiveness of major intervention strategies used in treatment of addictions. Elective course for Substantive Area: Focused Area of Study on Mental Health and Substance Abuse in Social Work Practice.

### **5327. Ethnic Minorities and the Social Work Profession: Black Experience**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Considers the Black Experience from historical, social, political, and economic perspectives. Addresses the evolution of male/female roles and relationships, the genesis of Black family patterns, and the consequences for social work practice. Examines the impact of poverty and discrimination in a context of international and national cultural factors. Required course for Substantive Area: Focused Area of Study on Black Studies for Social Work Practice; Elective course for Substantive Area: Focused Area of Study on Urban Issues in Social Work.

### **5328. Ethnic Minorities and the Social Work Profession: The Puerto Rican/Latino/a Experience**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Considers the Puerto Rican experience in the United States from the historical, social, political, economic, and cultural perspectives. Examines the impact of poverty, migration, and discrimination on individuals, families and communities. Required course for Substantive Area: Focused Area of Study on Puerto Rican/Latino/a Studies Social Work; Elective course for Substantive Area: Focused Area of Study on Urban Issues in

Social Work; Elective course for Substantive Area: Focused Area of Study on International Issues in Social Work.

### **5344. Aging and Mental Health**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Uses ecological theory as a framework for understanding the psychological processes of adaptation and the mental health needs of the elderly. Analyzes various service arrangements in terms of their usefulness in rehabilitation and prevention. Elective course for Substantive Area: Focused Area of Study on Social Work Practice with Older Adults.

### **5352. Death and Dying**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Focuses on dying as experienced by persons of all ages (not only the elderly) and on its psychological concomitants, such as rage and grief, bereavement and mourning; suicide and suicide prevention; dying as a career with identifiable states, as well as the concept of death as a social phenomenon. Elective course for Substantive Area: Focused Area of Study on Mental Health and Substance Abuse in Social Work Practice. Elective course for Substantive Area: Focused Area of Study on Social Work Practice with Older Adults.

### **5357. Social Gerontology**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Considers the societal aspects of aging, including the social psychological concomitants of adjustments, changing roles, and systems of social relationships. Includes an overview of the economic aspects of aging and the service delivery system. Required course for Substantive Area: Focused Area of Study on Social Work Practice with Older Adults.

### **5367. Culture and Health/Mental Health Disparities: Micro and Macro Perspectives**

Three credits. Prerequisite: FED 5301.

This course will examine health/mental health disparities as it relates to contemporary micro and macro practice with diverse populations. The objective of the course is the examination and analysis of the inter-relations among differential diagnosis, culture, and varying treatment strategies. The content will cover important aspects of health such as factors influencing wellness and disease, contemporary socio-political factors, and agendas that shape how health care services are delivered and accessed. We will explore current domestic and international health epidemics, discuss their implications for populations that are at risk, and the professional communities' responses to them.

### **5370. The LGBTQ Experience: Sexual and Gender Diversities**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Examines the problems of America's homosexual minority. Presents homophobia (fear of homosexuals or homosexuality) as a prejudice held by all people, gay and straight, in a society which holds that heterosexuality is the "normal" and "acceptable" behavior and attitude. Intended to expand the students' awareness of how homophobic attitudes affect them and their

relationships with other people in both professional and non-professional settings.

**5373. Leadership Development in Anti-Violence Work: The Susan Schechter Social Action Seminar**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Collaboratively sponsored by Futures Without Violence, The Susan Schechter Leadership Development Fellowship and University of Connecticut School of Social Work, this interdisciplinary seminar will give students a structure for developing their analytic and social action abilities in the area of violence against women, children and in families. Study of the movement to end violence against these populations and its connections to other social change movements, such as civil rights and GLBT rights will be examined. The leadership approach demonstrated in the course is based on the work of Susan Schechter, an academic, activist, practitioner and writer.

**5376. Puerto Rican and Latina Women and Their Reality**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Emphasizes the double oppression that the Puerto Rican woman faces. Analyzes the double burden that she confronts when seeking to maintain her identity as a Puerto Rican and as a woman in a society which discriminates against both groups. Equal emphasis is placed on issues of racism, classism, and heterosexuality since these issues create an even stronger burden on Puerto Rican women. Special consideration is given to Puerto Rican cultural aspects of the socialization process of males and females with a focus on rigid adherence to sex roles (e.g., machismo - marianismo). Elective course for Substantive Area: Focused Area of Study on Puerto Rican/Latino/a Studies Social Work; Elective course for Substantive Area: Focused Area of Study on Social Work with Women and Children in Families; Elective course for Substantive Area: Focused Area of Study on Urban Issues in Social Work.

**5381. Child Maltreatment: History, Theory, Prevention and Intervention**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Primarily for students with some practice experience in family and children's services, examines the phenomena of child abuse and neglect and societal and professional responses aimed at their prevention and treatment. As with other courses in the Substantive Area in Family and Children's Services, it is presented in the context of ecologically oriented, family-centered child welfare policy and practice. Elective course for Substantive Area: Focused Area of Study on Social Work with Women and Children in Families.

**5386. Studies in the Holocaust: Implications for Social Work**

Three credits. Prerequisite: Open only to Social Work M.S.W. and non-degree students.

Focuses on the Holocaust and its many implications for social work students. The course traces the rise of the Nazi totalitarian state resulting from defeat after World War I, the world wide depression of the 1930's and Hitler's targeting of Jews in Germany and eventually Europe-wide. The

lessons for social workers will be drawn from these experiences. The integration of this material by students into other courses is encouraged.

**5393. Emerging Issues in Mental Health and Substance Abuse**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program. May be repeated once for credit.

This course is designed to introduce students to current issues confronting providers of mental health and addiction services and consumers of these services as we enter the 21st Century. Philosophies about people with mental health, addiction and co-occurring disorders are changing in response to the developing knowledge base and the rise of consumer movements. Specific emphasis on the growing need for broad based multicultural service systems for consumers will be fostered. Issues of poverty and the "severely and predominantly mentally ill" will be discussed. Required course for Substantive Area: Focused Area of Study on Mental Health and Substance Abuse in Social Work Practice.

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**Human Development and Family Studies (HDFS)**

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**5000. Independent Study**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Advanced study for qualified students who present suitable projects for intensive, independent investigation in human development and family studies.

**5001. Seminar**

One credit. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Seminar in professional orientation to the field of human development and family relations.

**5003. Research Methods in Human Development and Family Studies I**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Family and human development procedures, research experience related to analyzing interpersonal interaction and developmental processes.

**5004. Research Methods in Human Development and Family Studies II**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Advanced family and human development research methods; research design and underlying methodological issues in analyzing interpersonal interaction and developmental processes.

**5005. Qualitative Research Methods in Human Development and Family Studies**

Three credits. Prerequisite: HDFS 5003; open only to Human Development and Family Studies graduate students; instructor consent required.

Philosophical bases of qualitative research in the social sciences; developing qualitative strategies; including: existential-phenomenological, intensive interviews, participant observation, and textual analysis.

**5010. Practicum in University Teaching of Human Development and Family Studies**

Three credits. Prerequisite: Instructor consent.

Supervised teaching of undergraduate courses in Human Development and Family Studies.

**5020. Culture, Health and Human Development**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

Introduction to current interdisciplinary approaches to the study of human development and health in the context of culture. An overview of theoretical approaches; presentations of current research by invited speakers, focusing on how to combine disciplinary perspectives and methods in order to build a new integrative science of health and development across and within cultures.

**5021. Culture, Health and Human Development**

One credit. Prerequisite: Open to graduate students in Human Development and Family Studies with instructor consent; others with permission. May be repeated for a maximum of six credits.

Introduction to current interdisciplinary approaches to the study of human development and health in the context of culture. An overview of theoretical approaches; presentations of current research by invited speakers, focusing on how to combine disciplinary perspectives and methods in order to build a new integrative science of health and development across and within cultures.

**5030. Research Practicum**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Supervised research in family studies.

**5031. Culture, Health and Human Development Project**

Three credits. Prerequisite: Department consent. May be repeated for a maximum of six credits.

Group discussion and guidance through planning, implementation, and write-up of a publishable research project in fulfillment of a core requirement for the Graduate Certificate in Culture, Health, and Human Development.

**5032. Research Seminar in Qualitative Methods**

Three credits. Prerequisite: Instructor consent. Recommended preparation: HDFS 5005.

Discussion and application of qualitative methods as applied to students' individual ongoing research projects. Participants must be currently conducting research using qualitative methods.

**5088. Supervised Field Work in Family Development**

Variable (1-6) credits. Prerequisite: Open only to Human Development and Family Studies graduate students; instructor consent required. May be repeated for credit.

Work in a community agency related to the field of family development.

**5095. Special Topics in Human Development and Family Studies**

(Formerly offered as HDFS 5002.) Variable (1-3) credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent. With a change of topic, students may enroll up to four times for a maximum of 12 credits.

In-depth investigation of a recent issue of human development and family studies.

**5098. Current Issues in Human Development and Family Studies**

(Formerly offered as HDFS 5007.) Variable (1-3) credits. Prerequisite: Open only with instructor consent. May be repeated for a maximum of 12 credits with a change of topic.

Focused presentation and discussion of an aspect of theory or methods related to advancing the field of human development and family studies.

**5101. Infant and Toddler Development**

Three credits. Prerequisite: Instructor consent.

Contemporary theories and research on infant and toddler development; evaluation of prevention and intervention programs designed to address contemporary social issues facing infants/toddlers and their families.

**5102. Early and Middle Childhood Development**

Three credits. Prerequisite: Open to graduate students in Human Development and Family Studies; others by permission.

Theory and research related to early and middle childhood as a developmental period. Focus will be on topics such as executive functioning and cognitive development, language and literacy development, peer relations, gender roles, aggression, and prosocial behaviors, as well as on prevention and intervention programs designed to address contemporary social issues facing children and their families.

**5103. Adolescent Development**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Adolescent development; understanding the various forces related to adolescent behavior.

**5110. Families, Communities, and Positive Behavior Supports**

Three credits. Prerequisite: Instructor consent.

Analysis of theory, research, systems, and curricula in Positive Behavior Supports (PBS) with emphasis on family and community partnerships. Interventions for problem behavior are examined across context and perspective. Open to graduate students in Human Development and Family Studies and related fields, and (with permission) to upper level undergraduates and those enrolled in the Honors Program.

**5150. Human Attachment across the Lifespan**

Three credits.

Theory and research on attachment, separation, trauma, and loss; lifespan approach to studying continuity or discontinuity from infant-parent attachment to peer-peer interactions to adult relationships.

**5215. Models and Concepts of Lifespan Human Development**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Overview of approaches to understanding human development across the lifespan. Emphasis on models that cross-disciplinary boundaries to explore development in social and cultural contexts.

**5232. Research Seminar in Adult Development and Aging**

Three credits. May be repeated for a maximum of nine credits.

Research models and approaches specific to studying development in the latter half of the lifespan. Development of an individual research project.

**5240. Aging: Personality and Social Interaction**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Patterns of adjustment to aging; continuity versus change in personality, role changes, and family relations of the elderly.

**5248. Adaptation and Development in Adulthood**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Young adulthood through middle age with particular attention on transition episodes; stability and change in adult personality with attention to familial and other social relationships.

**5250. Close Relationships**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Formation, maintenance, and dissolution of close relationships across the life span; relationships like courtship, marriage, parent-child, and friendships.

**5255. Living with Chronic or Life-threatening Illness**

Three credits. Prerequisite: Instructor consent.

Chronic and/or life-threatening illness from diagnosis through long-term management. Psychological, interpersonal, family, and ethical aspects of the chronic illness experience across the life span, in contexts for culture and health policy.

**5269. Gender Role Transitions and Conflicts Over the Lifespan**

Three credits.

The identification and study of men's and women's gender role transitions and conflicts over the lifespan using psychosocial theory. Developmental stages and tasks are critically analyzed using psychological, sociological, multicultural, and gender role theories and research.

**5277. Human Sexuality**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Human sexual behavior and attitudes.

**5310. Patterns and Dynamics of Family Interaction**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Readings and research concerning the family, stressing interpersonal processes and communication.

**5311. Theories of Family Development**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Concepts and theories in the area of family development.

**5312. Diverse Families: Adaptations across the Lifespan**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

An interdisciplinary examination of the issues and experiences of diverse families within sociological and psychological contexts and how factors such as race, ethnicity, and culture shape contemporary family life across the lifespan.

**5320. Special Issues in Family Development**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Theory, research and practice applied to special issues in human development and family relations over the life span.

**5321. Seminar on Parent-Child Relations in Cross-Cultural Perspective**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Research and theory regarding the antecedents and effects of major dimensions of parental behavior on child development in the U.S.A. and cross-culturally, parental warmth, control, punishment, and their interactions.

**5340. Prevention, Intervention, and Public Policy**

Three credits.

Survey course of the theory, practice and science of primary prevention of human problems. Prevention concepts and case studies are presented. Students give analysis and critique of course content and develop personal and professional perspectives on prevention practice and possible social policy initiatives.

**5342. Parent Education**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Planning, implementation, and evaluation of parent education programs for individuals and groups. Development and use of materials for such programs.

**5442. Latina/o Health Disparities**

Three credits.

Overview of health and health care issues among Latina/os in the United States with particular focus on health disparities.

**5550. Social Policy, Law, and Child Welfare**

Three credits.

Application of theory and research on child development, family relations, and intervention/prevention practices to legal, policy and child welfare contexts.

**5751. Foundations of Marriage and Family Therapy**

Three credits. Prerequisite: Open only to Human Development and Family Studies graduate students, others with consent.

Theoretical foundations of marriage and family therapy; basic principles of therapy, interactional patterns of marital dyads and families under stress; professional and ethical issues relevant to the practice of marriage and family therapy.

**5752. Building Cultural, Contextual, and Integrative Competencies in Marriage and Family Therapy I**

Two credits. Corequisite: HDFS 5751; instructor consent required.

Conceptual and applied learning and community immersion experiences that address the cultural, contextual, and integrative competencies considered necessary to serve effectively as marriage and family-therapy scientist/practitioners in today's intercultural society.

**5754. Marriage Therapy**

Three credits. Prerequisite or corequisite: HDFS 5751; open only to Human Development and Family Studies graduate students, others with consent.

Marital interaction and therapy. Theory and technique of contemporary therapeutic approaches.

**5756. Family Therapy**

Three credits. Prerequisite or corequisite: HDFS 5751; open only to Human Development and Family Studies graduate students, others with consent.

Contemporary clinical conceptualizations of family interaction, major contributions to the development of family therapy as a unique discipline. Issues and problems commonly confronted in conducting family therapy.

**5757. Building Cultural, Contextual, and Integrative Competencies in Marriage and Family Therapy II**

Two credits. Prerequisite: Instructor consent. Corequisite: HDFS 5756.

Conceptual and applied learning and community immersion experiences that address the cultural, contextual, and integrative competencies considered necessary to serve effectively as marriage and family-therapy scientist/practitioners in today's intercultural society.

**5759. Case Seminar in Marriage and Family Therapy**

Three credits. Prerequisite: HDFS 5751, and HDFS 5754 or 5756; instructor consent required. Corequisite: HDFS 5762.

Specialized professional issues and professional problems in the practice of marriage and family therapy. Case material.

**5761. Introduction to Clinical Practice and Professional Issues**

Three credits. Prerequisite or corequisite: HDFS 5751; open only to Human Development and Family Studies graduate students.

Clinical practice in the Center for Marital and Family Therapy and in approved clinical training centers. Classwork and supervised clinical practice required. Professionalism, ethics, confidentiality, therapeutic techniques, and procedures required for clinical practice.

**5763. Individual Supervision in Marriage and Family Therapy**

Variable (1-6) credits. Prerequisite: HDFS 5761, and HDFS 5754 or 5756; open only to Human Development and Family Studies graduate students; instructor consent required. May be repeated for a maximum of 24 credits.

**5764. Clinical Assessment and Practice**

Three credits. Prerequisite: Instructor consent.

Diagnosis and treatment of dysfunctional marital and family relationship patterns, nervous and mental disorders; major family therapy assessment methods and instruments.

**5782. Master's Practicum I in Marriage and Family Therapy**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

Supervised group experience in marriage and family therapy related to clinical practice in the Humphrey Clinic for Individual, Couple, and Family Therapy or other approved clinical training centers.

**5790. Theories and World Views Informing Marriage and Family Therapy**

Three credits. Prerequisite: Instructor consent.

Underlying theories and conceptualizations informing marriage and family therapy.

**5792. Master's Practicum II in Marriage and Family Therapy**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of six credits.

Supervised group experience in marriage and family therapy related to clinical practice in the Humphrey Clinic for Individual, Couple, and Family Therapy or other approved clinical training centers.

**6710. Family Therapy Research**

Three credits. Prerequisite: HDFS 5003; open only to Human Development and Family Studies graduate students, others with consent.

Family therapy research methods; research design and methodological issues in analyzing treatment interventions, family interaction processes, and change.

**6720. Family Therapy Supervision**

Three credits. Prerequisite: Instructor consent.

Major models and methods of marriage and family therapy supervision; ethical and legal responsibilities faced by marital and family therapy supervisors. Development of perceptual, conceptual, and executive skills needed to supervise and train practitioners in the field of marriage and family therapy.

**6730. Advanced Family Therapy**

Three credits. Prerequisite: HDFS 5751 and 5756; instructor consent required.

Current trends and issues in the field of family therapy; integration of clinical theory, research, and practice.

**6792. Doctoral Practicum in Marriage and Family Therapy**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

Supervised group experience in marriage and family therapy related to clinical practice in the Humphrey Clinic for Individual, Couple and Family Therapy or other approved clinical training centers.

**6895. Internship in Marital and Family Therapy**

Variable (1-6) credits. Prerequisite: Open only to Human Development and Family Studies graduate students; instructor consent required. May be repeated for credit.

Nine to 12-month period of full-time clinical experience in a cooperating institution. Open only with consent of instructor to students of advanced

standing in marital and family therapy. Offered at approved clinical training centers. The student assumes a full range of professional responsibilities associated with practice of marital and family therapy. Minimum of 500 hours of direct client contact and receipt of 100 hours of supervision.

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**Human Rights (HRTS)**

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**5005. Special Topics in Human Rights**

Three credits. Prerequisite: Instructor consent. May be repeated for up to nine credits with change in content.

In-depth investigation of an issue in human rights research.

**5095. Special Topics**

Variable (1-3) credits. Prerequisite: Instructor consent.

**5254. Managing the Future of Social Enterprise**

Three credits. Not open for credit to students who have passed or are taking BADM/BLAW 5254.

Developing and managing market-based approaches to global human rights and social issues. Strategizing how companies create value both for society and business, including role of for-profit businesses as agents for positive social impact in changing legal, regulatory, policy, and market environments. Regulatory and business strategies that serve markets and promote long-term economic viability, sustainability, and human rights. Managerial perspectives on social innovation, statutory benefit corporations, corporate social certifications, social investment, shared value, strategic philanthropy and business opportunities serving emerging markets.

**5301. Contemporary Debates in Human Rights**

Three credits. Prerequisite: Instructor consent.

Key Debates in Human Rights will introduce students to the main modern debates in the academic field of human rights. It is interdisciplinary in scope, including recent intellectual contributions from philosophy, law, political science, sociology, anthropology, literature and history. It will address a number of central issues and questions, including the normative philosophical foundations of human rights, whether human rights are universal or relative, whether human rights can be held collectively, and the justifications for women's rights and cultural rights.

**5390. Economic Rights**

(Also offered as ECON 5128.) Three credits. Prerequisite: Instructor consent.

Explores the conceptual bases, measurement, and policy applications of economic rights. Specific topics will include: child labor, the right to development, non-governmental initiatives, and the institutionalization of economic rights (e.g., constitutionalization versus statutory implementation versus discretionary policies).

**5499. Independent Study**

Variable (1-6) credits. Prerequisite: Open only to graduate students; instructor consent required. May be repeated for a total of 12 credits.

**5899. Seminar in Human Rights**

Three credits. May be repeated for up to nine credits with change in content.

Variable topics in the study of human rights.

## Humanitarian Services Administration (HSA)

### 5300. Independent Study

Variable (1-3) credits. Prerequisite: Instructor consent.

Independent study in various topics related to the HSA certificate program as designated and approved by the instructor assigned to oversee and grade the project.

### 5312. Issues in Humanitarian Studies

Three credits. Prerequisite: Instructor consent.

Examines current issues of Global Human Development from the perspective of non-governmental organizations (NGOs), private voluntary organizations, international organizations (IOs), multi-governmental aid and humanitarian assistance agencies, the U.S. military and government sponsored aid organizations. Students gain a comprehensive, multidisciplinary understanding of issues facing these organizations and stresses that are currently forcing many to reevaluate their current policies and procedures.

### 5325. Advocacy and Grassroots Development

Three credits.

Addresses the importance of advocacy in the sustainable development process. Introduces the concept of advocacy, its role and functions in sustainable development and empowerment. Students will be given the opportunity to explore ways and means to develop effective advocacy programs.

### 5332. International Human Rights

Three credits. Prerequisite: Department consent.

Addresses the evolution of international human rights and of the legal instruments designed for their promotion and protection. It will study the theoretical foundations of the idea of human rights in various civilizations and cultures, evaluate its legacy within the western and non-western traditions, and examine its meaning and relevance in the contemporary world.

### 5377. Environmental Compliance and Regulations

Three credits.

Compliance and knowledge of a whole new generation of environmental regulations is required of all managers. This course begins with general compliance obligations, common law, trespass, nuisance and negligence. The major federal environmental laws affecting companies and agencies are reviewed along with even more stringent state and local regulations. Also presented is a view of the severe civil and criminal penalties liabilities attached to environmental regulations, and a discussion of the sharply increasing punishments for non-compliance. The final section of the course will outline strategies for compliance with specific comments on proactive environmental management as a method for reducing legal exposure from environmental issues. This is required of managers and it empowers private citizens.

## Independent Study (IS)

### 5394. Independent Study

Variable (1-9) credits. Prerequisite: Open only to M.S.W. students; instructor consent required. May be repeated for a maximum of nine credits.

Special social work topics not included in the curriculum may be the subject of an Independent Study. A proposal to do an independent study must be presented no later than the second session of the semester in which the course is to be completed and be approved by the Director of Student Services. A maximum of three independent study courses or nine credits may be applied toward degree requirements.

## Individuals, Groups and Families (IGFP)

### 5301. Practice with Individuals, Groups and Families

Three credits. Prerequisite: BASC 5390, 5391 and FED 5301, 5351, or Advanced Standing; open to MSW students in the Individuals, Groups and Families concentration. Corequisite: FED 5302 and 5352, or Advanced Standing.

In-depth exploration of the skills of working with individuals, groups, and families. Social work practice with individuals, emphasizes the interdependence between assessment and intervention, the transactional nature of helping, and monitoring and evaluation of practice. Social work practice with groups, focuses on types of groups, leadership, forming and beginning the group, the role of mutual aid and use of program activities. Practice with families give emphasis to the family as a functional unit and the diversity of life style and structure and its capacity to respond to the needs of its members and changing environmental factors.

### 5302. Advanced Practice with Individuals, Groups and Families: Theoretical Approaches

Three credits. Prerequisite: IGFP 5301; open only to M.S.W. students in the Individuals, Groups and Families concentration. Corequisite: IGFP 5353 and FED 5301, or IGFP 5355.

Overview of theoretical approaches to working with individuals, groups and families. Helps students to think critically about the use of theory in practice, evidence based practice, and ways of learning and knowing, including use of supervision. Introduction to psychodynamic, attachment, cognitive, and behavioral, as well as solution-focused approaches and motivational interviewing. The stages of group development, group dynamics and other content related to social work practice with groups. Theoretical frameworks such as systems, multisystemic and attachment on which family practice approaches are based.

### 5303. Advanced Practice with Individuals, Groups and Families, Across Settings and Populations

Three credits. Prerequisite: Open only to M.S.W. students in the Individuals, Groups and Families concentration. Corequisite: IGFP 5354 and FED 5311, or IGFP 5355.

Builds upon content in previous IGFP courses about practice with individuals, groups and

families within the context of oppression and privilege, while integrating core concepts related to trauma, strengths, resilience, and empowerment. Primary focus on the differential knowledge and skills needed to work effectively in various fields of practice (e.g., health care, schools, and the criminal justice, child protection, substance abuse and mental health systems). Systems of care, interdisciplinary teams, and policies impacting social work within each field of practice, as well as common clinical approaches and other interventions with the populations served in these settings.

### 5311. Group Processes

Three credits. Prerequisite: Open to M.S.W. and non-degree Social Work students.

Helps students develop a conceptual frame of reference for understanding small group processes. Focus on establishing a theoretical and conceptual appreciation of how small groups function. Students will develop an increasingly wide range of conceptual tools to identify and assess group processes. Students will gain a better understanding of small group interaction as it impacts individuals, interpersonal relationships and interactions with others beyond the group. Experiential as well as didactic study methods will be used.

### 5340. Skills Lab

One credit.

Required of all students in the Advanced Standing Program in the Individuals, Groups and Families Concentration. Builds on knowledge gained and intervention skills developed from students' BSW course work and field work. Students will have an opportunity to identify, practice, and analyze a range of assessment intervention skills.

### 5342. Group Work Practice in Therapeutic Settings

Three credits. Prerequisite: FED 5301 or Social Work Advanced Standing; open only to M.S.W. students in the Individuals, Groups and Families concentration. Corequisite: FED 5302, 5310, or 5311.

Provides a theoretical base and group work practice skills for working with populations who have been diagnosed with a clinical condition(s). Focus on understanding how to use a strength-based, recovery oriented therapeutic group to foster the social and emotional growth that will promote optimal functioning and prevent relapse in persons with clinical conditions. Biological, behavioral, cognitive-behavioral and psychodynamic theories will be used to understand factors that contribute to clinical conditions and to develop the type of therapeutic group that responds to the social and emotional needs of the members of the group. Focus will be on diverse settings (inpatient, outpatient, prison, residential halfway houses) where clients with clinical conditions are served in open-ended and closed groups. DSM V will be used to develop diagnostic skills and understanding.

### 5345. Clinical Conditions with Children and Adolescents

Three credits. Prerequisite: FED 5301 or Social Work Advanced Standing; open only to M.S.W. students in the Individuals, Groups and Families concentration. Corequisite: FED 5302, 5310, or 5311.

Practice course paying equal attention to the values, skills, and knowledge required for social work practice with children, adolescents, and their families. These youth have a range of bio-psychosocial problems related to mental disorders. Students will learn a range of assessment and intervention skills and will become familiar with current psychiatric classification systems, such as the Diagnostic and Statistical Manual (DSM) and the International Classification of Diseases (ICD). Students will demonstrate the ability to access the most recent empirical and practice knowledge, and to develop skills related to work in a variety of mental health settings. Mental disorders will be learned within the context of larger bio-psychosocial systems. Attention is paid to differences based upon such variables as age, gender, ethnicity, race, religion, sexual orientation, and physical ability.

#### **5346. Clinical Conditions with Adults and Older Adults**

Three credits. Prerequisite: FED 5301 or Social Work Advanced Standing; open only to M.S.W. students in the Individuals, Groups and Families concentration. Corequisite: FED 5302, 5310, or 5311.

Practice course paying equal attention to the values, skills, and knowledge required for social work practice with adults and older adults who have a range of bio-psychosocial problems related to mental disorders. Students will learn a range of assessment and intervention skills and become familiarized with current psychiatric classification systems, such as the Diagnostic and Statistical Manual (DSM) and the International Classification of Diseases (ICD). Students will demonstrate the ability to access the most recent empirical and practice knowledge and to develop skills related to work in a variety of mental health settings. Mental disorders will be learned within the context of the larger bio-psychosocial system and attention is paid to differences based upon such variables as age, gender, ethnicity, religion, sexual orientation, and physical ability.

#### **5353. Advanced Field Education III**

Four credits. Prerequisite: Open only to M.S.W. students in the Individuals, Groups and Families concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Focuses primarily on the student's method concentration, emphasizing preparation for competent, advanced specialized practice.

#### **5354. Advanced Field Education IV**

Four credits. Prerequisite: IGFP 5353; open only to MSW students in the Individuals, Groups and Families concentration. Corequisite: IGFP 5303 and FED 5311. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Focuses primarily on the student's method concentration, emphasizing preparation for competent, advanced specialized practice.

#### **5355. Field Block Placement for Individuals, Groups and Families**

Eight credits. Prerequisite: FED 5302 and 5352; open only to MSW students in the Individuals, Groups and Families concentration; instructor consent. Corequisite: IGFP 5302, 5303, and FED

5350. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Field education in Individuals, Groups and Families for well-prepared students who have completed all course requirements except the second year of field education.

#### **5365. Family Therapy: Theory and Practice**

Three credits. Prerequisite: Students should currently be in field practice or employed in a casework-oriented agency. Approval must be granted by instructor, advisor, and Office of Student and Academic Services.

Provides knowledge of significant theories, theorists, practice skills and techniques for family therapy, as well as the growing professional self-awareness of the practitioner. Provides: a) opportunities to study the use of family practice with particular problem situations; b) critical analysis of changes in current theories, emerging theories and integration of theories; c) analysis of research in family practice; and d) an ongoing seminar for discussion of cases.

### **Information Science and Knowledge Management (ISKM)**

#### **5013. Information Security**

Three credits.

A survey of security in the creation, storage, and distribution of information. Topics include networks, threats, vulnerabilities, risk assessment methodologies, physical protection and emergency response teams (CERT). The organization of the Internet in terms of management and operations will be presented in depth, including domain names, registrars, ICANN and related policy.

### **International Studies (INTS)**

#### **5000. Seminar in International Studies**

Three credits. Prerequisite: Instructor consent.

Combines the various disciplines that constitute International Studies. Includes Social Sciences, Humanities, and Development Studies (development economics and administration). Area Studies faculty from relevant departments will conduct the individual seminar sessions. Introduces concepts and theoretical issues of the fields, including research approaches and the formulation of research questions. Develops analytical thinking and writing skills in an interdisciplinary context. Utilizes a combination of reading, discussion, short papers, presentations, and research exercises. Library research and on-line resources are also covered.

#### **5110. Independent Study**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit with a change of content.

### **Italian Literary and Cultural Studies (ILCS)**

#### **5315. Introduction to Contemporary Literary Studies**

Three credits.

Contemporary methods and fields of literary analysis. Paradigms of literary studies and overview

of Marxist, Freudian, Feminist, Historicist, and Culturalist criticism.

#### **5330. The Literature of the Origins**

Three credits.

Poets and poetical schools of the Duecento from the Franciscans to the Sicilians and the "Dolce stil nuovo."

#### **5333. Seminar on Boccaccio**

Three credits.

The Italian lyrics and narrative poems, the Decameron and its seminal importance for prose fiction, the scholarly Italian and Latin works.

#### **5335. Baroque Literature**

Three credits.

The beginnings of baroque literary style and its ramifications in the seventeenth century.

#### **5337. Theories and Methods of Modern Criticism I**

Three credits.

Aesthetic problems from Vico to the present day.

#### **5339. Seminar on Modern Literature**

Three credits. May be repeated for a maximum of nine credits.

One leading writer from the last two centuries.

#### **5340. Divina Commedia**

Three credits.

#### **5345. Studies in Italian Literature or Philology**

Variable (1-6) credits. May be repeated for credit.

#### **5347. Italian Chivalric Poetry**

Three credits.

#### **5352. Modern Italian Poetry I**

Three credits.

Post-romantic masters through the twentieth century experiments: e.g., the Crepuscolari, Futurists, Hermeticists.

#### **5354. Masters of Twentieth-Century Fiction**

Three credits.

Pirandello, Svevo, Moravia, Pavese, Vittorini.

#### **5375. Topics in Early Modern Italian Studies**

Three credits. Prerequisite: open only to graduate students in Italian. May be repeated once for credit with a change in topic.

A variable topics course focusing on early modern Italian culture.

#### **5376. Topics in Modern and Contemporary Italian Studies**

Three credits. Prerequisite: open only to graduate students in Italian. May be repeated once for credit with a change in topic.

A variable topics course focusing on modern and contemporary Italian culture.

#### **5377. Topics in Transnational Italy**

Three credits. Prerequisite: open only to graduate students in Italian. With a change in topic, may be repeated for a maximum of six credits.

Variable topics course focusing on cultural, historical and political intersections between Italy and other nations.

## Kinesiology (KINS)

### 5099. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

### 5100. Musculoskeletal Examination and Acute Treatment I

Four credits.

Introduces the common types of orthopedic injuries and/or dysfunctions that occur to the upper extremity during physical activity and/or athletics. Injuries will be discussed from the following viewpoints: etiology and mechanism of injury; pathology; recognition and evaluation techniques; protocols; and prevention. Students will also learn to apply the techniques of orthopedic injury assessment and evaluation as well as the immediate care of those injuries.

### 5103. Therapeutic Interventions in Athletic Training II

Two credits.

Prepares students to apply an integrated approach to the treatment and rehabilitation of athletic injuries and conditions. Students will take an active role in learning to plan, implement, document, and evaluate the efficacy of therapeutic interventions in the treatment of injured physically active people.

### 5105. Clinical Epidemiology in Athletic Training

Three credits.

Athletic training students will be instructed in the use of proper medical documentation through lecture and class discussion. This course will provide the student with the knowledge of medical terminology and abbreviations necessary to communicate with physicians and other healthcare professionals. Students will develop an understanding of evidence-based medicine, health related quality of life and outcome assessments.

### 5107. Orthopedic Assessment and Treatment of the Spine

Three credits.

Covers anatomy, evaluation, pathology of spinal injuries and conditions, diagnosis, and management of injuries related to the spine, thorax, and core.

### 5109. General Medical Aspects in Athletic Training

Four credits.

Prepares the athletic training student to recognize, evaluate, and manage common general medical conditions that may affect physically active individuals. Conditions that affect all of the major body systems will be discussed. Information regarding the relationship between nutrition and physical fitness for the purpose of developing individualized nutrition plans for physical fitness and general well-being will be provided.

### 5110. Leadership, Administration, and Professional Development in Athletic Training

Three credits.

Concepts for students majoring in athletic training regarding professional development and healthcare administration and organization. Topics related to personnel management, leadership, daily operations, finance, facility design,

information management, workshop development, interviewing skills, ethics and ethical decision-making, organizational structure, work-place culture, among other topics that pertain to the profession of athletic training will be discussed.

### 5111. Practical Applications of Injury Assessment and Care

Two credits.

Provides students an opportunity to solidify, improve upon and refine assessment skills, treatment plans and rehabilitation prescription. Students' ability to provide proper documentation utilizing a written SOAP note, including differential diagnoses as well as immediate treatment and short and long-term rehabilitation plans will be assessed throughout the semester.

### 5112. Counseling Strategies and Psychology of Athletic Injury

Three credits.

Prepares students to recognize clients/patients exhibiting abnormal social, emotional, and mental behaviors. Coupled with recognition is the ability to intervene and refer these individuals as necessary. Students learn to appreciate the role of mental health in injury and recovery and use interventions to optimize the connection between mental health and restoration of participation.

### 5113. Principles of Neuromuscular Conditioning and Sport Performance

Three credits.

Prepares the entry-level athletic trainer to be versed in strength and conditioning principles and exercise as a means to help prevent and rehabilitate musculoskeletal injuries. The physiology behind muscle and bone development related to exercise and strength training and designing targeted strength training programs to treat abnormalities after injury and to optimize performance will be discussed.

### 5200. Athletic Training Clinical Rotation I

Two credits.

Students work directly with a certified athletic trainer serving as the clinical preceptor and are assigned to a specific athletic training practice setting. This experience involves providing day-to-day care for the participants, as well as administering treatments and rehabilitation under the supervision of the clinical preceptor. Students will be expected to be immersed daily into the role of the athletic trainer.

### 5203. Athletic Training Clinical Experience IV

Four credits.

Students work directly with a certified athletic trainer and are assigned to a specific athletic training practice setting. Involves providing day-to-day care for the participants, as well as administering treatments and rehabilitation under supervision of the certified trainer. Students will be expected to be immersed daily into the role of the athletic trainer.

### 5204. Athletic Training Clinical Experience V

Three credits.

Students work directly with a certified athletic trainer and are assigned to a specific athletic training practice setting. Involves providing day-to-day care for the participants, as well as administering treatments and rehabilitation under supervision

of the preceptor. Students will be expected to be immersed daily into the role of the athletic trainer.

### 5205. Culminating Athletic Training Clinical Experience

Six credits.

Students work directly with a certified athletic trainer and are assigned to a specific athletic training practice setting. Involves providing day-to-day care for the participants, as well as administering treatments and rehabilitation under supervision of the preceptor. Students will be expected to be immersed daily into the role of the athletic trainer.

### 5208. Research Design and Implementation in Athletic Training

Four credits.

Acquaints students of athletic training with recent research in the field, components of conducting and publishing research in athletic training, and preparation for research endeavors at the graduate level. Covers relevant issues/policies/laws related to athletic training that are currently being debated, discussed, and/or implemented and the local and national level.

### 5488. Theory of Clinical Analysis

Three credits. Prerequisite: Instructor consent.

Provides an introduction to the principles and procedures of various tests performed in clinical chemistry. Presents the physiological basis, principle and procedures and the clinical significance of test results, including quality control and reference values. Emphasizes basic chemical laboratory technique, electrolytes, acid-base balance, proteins, carbohydrates, lipids, enzymes, endocrine function, TDM, toxicology, hematology, and coagulation.

### 5500. Research Techniques and Experimental Designs in Exercise Science

Three credits.

Gives an understanding of research designs and methods in exercise science when examining different research topics related to human, animal and cell culture models.

### 5507. Fundamentals of Exercise Prescription

Three credits. Prerequisite: Instructor consent. Recommended preparation: an undergraduate course in exercise prescription and/or exercise science/kinesiology.

An examination and application of the principles of exercise prescription in primary disease prevention. Students will advance their knowledge in the exercise pre-participation health screening and pre-exercise evaluation processes. Students will develop exercise prescriptions for healthy adults and adults with multiple cardiovascular disease risk factors and/or special considerations. Student will learn how to adjust an exercise prescription for clients taking common medications that affect the exercise response and learn behavioral strategies to improve exercise adherence.

### 5508. Exercise Prescription for Individuals with Chronic Diseases and Health Conditions

Three credits. Prerequisite: KINS 5507.

Taught online. An in-depth examination and application of the principles of exercise prescription for individuals living with chronic diseases and health conditions. Students will advance their knowledge in prescribing exercise for special populations that include groups with

cancer, cardiovascular, pulmonary, metabolic, neuromuscular, and musculoskeletal diseases and conditions across the lifespan, among others.

#### **5512. Preventing Sudden Death in Sport**

Three credits. Prerequisite: Instructor consent.

Provides an in-depth examination of the causes of sudden death in the athletic/exercise environment. The most current evidence-based guidelines pertaining to the prevention, recognition, and treatment of these conditions will be explored and discussed.

#### **5514. Legal Considerations of Sudden Death in Sport--Issues for Medical Staff and Athletic Administrators**

Three credits.

A seminar for Kinesiology graduate students using formal instruction regarding legal aspects of sudden death in sport. Covers sport law concepts drawing upon the case law of recent incidents of sudden death in sport to explore the various criminal and civil legal ramifications that arise when preventable deaths occur in domain of organized sport and physical activity.

#### **5515. Scientific Presentations**

Three credits.

Skills required for writing scientific articles and abstracts, reviewing manuscripts, and presenting results at scientific meetings.

#### **5530. Physiology of Stressful Environments**

Three credits.

Exercising and resting responses/adaptations/illnesses to high altitude, cold, hyperbaric, polluted, and zero gravity environments. The acute and chronic effects of electromagnetic radiation fields and sleep deprivation will also be studied.

#### **5533. Current Research and Issues in Athletic Training**

Three credits. Prerequisite: Instructor consent.

Acquaints students of athletic training with the recent research in the field, the components of conducting and publishing research in this field, and preparation for research endeavors at the graduate level. Covers relevant issues, policies, and laws related to athletic training that are currently being regionally or nationally debated, discussed, and/or implemented.

#### **5534. Advanced Clinical Care in Sports Medicine**

Three credits.

A discussion/lecture-based class designed to explore advanced topics for graduate students in athletic training. Furthers students' knowledge and skills regarding "hot" topics within the athletic training profession.

#### **5550. Children and Physical Activity**

Three credits.

Overview of systems physiology for pediatric individuals. The impact of physical activity and chronic training will be evaluated.

#### **5595. Special Topics in Exercise Prescription**

Three credits. Prerequisite: KINS 5507.

Taught online. An in-depth examination and application of the principles of exercise prescription for healthy populations with special considerations, and unique circumstances under which people exercise related to both athletic and clinical populations. Students will advance their knowledge

in prescribing exercise for healthy populations with special populations such as children and older adults, populations with unique considerations such as the spinal cord injured and amputee athletes, and unique exercise circumstances such as environmental considerations and wearable technologies, among others.

#### **6094. Seminar**

Variable (1-6) credits. May be repeated for a maximum of 12 credits.

Cooperative study of developments and problems in the student's area of specialization.

#### **6100. Data Analysis and Reporting in Kinesiology**

Three credits.

Analyzes data and critically appraises research literature using a broad variety of methods applicable to laboratory and clinical research. Students will gain experience using software to analyze data germane to exercise kinesiology and report results in a manner consistent with leading journals in the field. Knowledge of basic statistical principles is assumed.

#### **6102. Concepts and Principles of Clinical and Classroom Teaching in Athletic Training**

Three credits.

Lecture and discussion-based course provides the athletic trainer with formal instruction regarding clinical supervision and teaching. Covers both effective strategies and techniques for success in the classroom as well as in the clinical education setting.

#### **6103. Employment Concepts and Issues in Athletic Training**

Three credits. Prerequisite: Instructor consent.

Lectures and discussions to cover topics related to workplace structure, organizational culture, professional socialization and professional development.

#### **6106. Qualitative Research Methods**

Three credits. Prerequisite: Instructor consent.

The role of qualitative research in healthcare and exercise science. Examines major approaches used in conducting qualitative research and the application of these methods to problems and phenomena in healthcare and athletic training. Emphasizes the developmental process prior to collection, collection, management, analysis, and interpretation of qualitative data. Exploration and application of topics such as sampling, interviewing and observation techniques, data analysis methods, and reporting of qualitative research. Examines evaluation and critique of research studies utilizing qualitative methods.

#### **6320. Advanced Sport Sociology**

Three credits.

Advanced topics in sport sociology and sport psychology with special emphasis on those models and theoretical perspectives that are associated with generating significant research in the area.

#### **6425. Special Topics in Health and Wellness Across the Lifespan**

Three credits. Prerequisite: Instructor consent.

An in-depth examination of health issues across the lifespan. Perspectives from social and behavioral health science, occupational and environmental health science, and/or public health policy.

#### **6450. Exercise Endocrinology**

Three credits.

Overview of cellular endocrinology with a focus on the impact of acute and chronic exercise on these systems.

#### **6500. Exertional Heat Stroke**

Three credits. Prerequisite: Instructor consent.

An in-depth examination of pathophysiology, prevention, recognition, treatment, and return to play considerations for exertional heat stroke, with a secondary emphasis on all exertional heat illnesses.

#### **6512. Advanced Resistance Training Physiology**

Three credits.

Provides students with an in-depth overview of the physiological mechanisms mediating the different exercise prescriptions in resistance training.

#### **6520. Thermal Physiology**

Three credits.

Detrimental effects which exercise in the heat and dehydration have on: cardiovascular function, strength, endurance, fluid-electrolyte balance, disposition, and heat tolerance.

#### **6525. Muscle Physiology in Exercise and Sport**

Three credits.

Structural, morphological and biochemical changes in muscle with exercise and training.

#### **6530. Repair of Musculoskeletal Tissue**

Three credits.

Fundamental processes necessary for the understanding of our physiologic response to injury stress, healing and recovery. Intended for graduate students in the Department of Kinesiology. The scope of physiologic discussion will span from cell to organism. Discussion will center on systemic and tissue specific responses to injury. Some prior exposure to organ level physiology, endocrinology, and cell biology is recommended.

#### **6535. Neuromuscular Function and Effects of Injury**

Three credits.

The structural and neural properties of skeletal muscle and the response to injury will be examined.

#### **6550. Body Weight Regulation and Exercise**

Three credits.

Factors impacting body weight, including neuroendocrine control of metabolism and body weight. The role of physical activity in the maintenance of body weight is also considered.

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### **Latino and Latin American Studies (LLAS)**

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#### **5000. Seminar in Latin American Studies**

Three credits.

Interdisciplinary introduction to graduate level study of Latin America.

#### **5100. Comparative Transnational Latin(o) American History**

(Also offered as HIST 5610.) Three credits. Prerequisite: Instructor consent.

Critical issues in diverse U.S. Latina/o histories and forces that contributed to the arrival of people of Latin American and Caribbean heritage to the

United States. Topics include the epistemological origins and historiographical traditions of the field; U.S. empire; labor, migration, and diaspora; border formations; constructions of gender and sexuality; and comparative racialization.

#### 5105. Special Topics

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

#### 5110. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit with change in content.

#### 5300. Special Topics in Puerto Rican and Latin American Studies

Three credits. May be repeated for a maximum of six credits.

Intensive study of specialized topics not ordinarily covered in the graduate curriculum, taught by visiting scholars or joint appointment faculty.

#### 5360. Latinos and U.S. Education

Three credits.

Latinos and U.S. education.

#### 5390. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent.

Independent study.

#### 5890. Latin American Studies Project

Three credits. Prerequisite: Instructor consent.

Independent, interdisciplinary research project culminating in a written paper, developed by the student under the supervision of a committee consisting of a first and second reader. The first reader will be the major advisor on the project. Capstone course for the master's degree, to be taken after all other course requirements are completed.

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## Linguistics (LING)

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#### 5000. Introduction to Computational Linguistics

Three credits. Prerequisite: Open only to Linguistics graduate students, others with consent. Recommended preparation: at least one course in Linguistics or Computer Science.

Computational methods in linguistic analysis and natural language processing. Topics include the use of text corpora and other sources of linguistic data; morphological analysis, parsing and language modeling; applications in areas such as information retrieval and machine translation.

#### 5010. Research Seminar in Language and Psychology

One credit. Prerequisite: Open only to Linguistics graduate students. May be repeated for a maximum of three credits.

#### 5110. The Acquisition of Syntax

Three credits.

Relationship between the syntax of children's language and linguistic theory.

#### 5120. Readings and Research in Acquisition

Three credits. Prerequisite: LING 5110. May be repeated for a maximum of 12 credits.

Lectures and discussion of classic and current articles in first language acquisition; presentation of ongoing student research.

#### 5310. Phonology I

Three credits. Prerequisite: Open only to Linguistics graduate students, others with consent.

The analysis of sound patterns in languages within a generative framework: distinctive features, segmental and prosodic analysis, word formation, the theory of markedness.

#### 5320. Phonology II

Three credits. Prerequisite: LING 5310.

The analysis of sound patterns in languages within a generative framework: distinctive features, segmental and prosodic analysis, word formation, the theory of markedness.

#### 5410. Semantics I

Three credits. Prerequisite: Open only to Linguistics graduate students, others with consent.

The bases of formal models of syntax and semantics. Compositionality; quantification; Logical Form.

#### 5420. Semantics II

Three credits. Prerequisite: LING 5410.

Theories of meaning and reference. Formal treatment of meaning in a generative grammar.

#### 5500. Advanced Introduction to Syntax

Three credits. May be repeated for a maximum of six credits.

Concepts and tools of current syntactic theory. Syntactic features, lexical and functional categories, representation of phrase structure, argument structure, case, movement, locality.

#### 5510. Syntax I

Three credits. Prerequisite: Open only to Linguistics graduate students, others with consent.

Transformational analysis within a Chomskyan framework; deep structure, surface structure, universal conditions on the form and application of transformational rules.

#### 5520. Syntax II

Three credits. Prerequisite: LING 5510.

Transformational analysis within a Chomskyan framework; deep structure, surface structure, universal conditions on the form and application of transformational rules.

#### 5799. Directed Reading in Linguistics

Variable (1-6) credits. May be repeated for a maximum of 12 credits.

#### 6020. Professional Methods

One credit. Prerequisite: Open to graduate students in Linguistics, others with permission. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Practice in writing abstracts for academic conferences. Preparation for academic job market: C.V.s, letters of application, interviews, job talks. Previous completion of three semesters of full-time graduate course work in Linguistics recommended.

#### 6040. Structure of a Selected Language

Three credits. Prerequisite: LING 5310 and 5510. May be repeated for a maximum of 12 credits.

Phonological and syntactic problems of a given language.

#### 6050. Field Methods in Linguistics

Three credits. Prerequisite: LING 5310 and 5510. May be repeated for a maximum of 12 credits.

Collection and analysis of linguistic data from native consultants.

#### 6110. Methods in Acquisition

Three credits. Prerequisite: LING 5110.

Experimental methods for first language acquisition research.

#### 6120. Topics in Acquisition

Three credits. Prerequisite: LING 5110. May be repeated for a maximum of 12 credits.

Current topics in first language acquisition research.

#### 6160. Second Language Acquisition

Three credits.

Current research on theories of second language acquisition. Differences between first and second language development, including views on the availability of universal grammar. Linguistic input and the effect of age of immersion in a second language. Research methodologies and their validity will be discussed. Pedagogical implications derivable from this research will be addressed. Student research component.

#### 6210. Morphology

Three credits. Prerequisite: LING 5310 or 5510; instructor consent required.

Introduction to morphological analysis and to the methods of linguistic segmentation. The Lexicon. The relationships between Phonology and Morphology and between Syntax and Morphology. The nature of clitics.

#### 6310. Problems in Phonology

Three credits. Prerequisite: LING 5320. May be repeated for a maximum of 12 credits.

Advanced work in phonology.

#### 6410. Semantics Seminar

Three credits. Prerequisite: LING 5420. May be repeated for a maximum of 12 credits.

Classical and recent literature and current research in semantics.

#### 6420. Topics in Semantics

Three credits. Prerequisite: LING 5420. May be repeated for a maximum of 12 credits.

Current topics in semantic research.

#### 6510. Readings and Research in Syntax

Three credits. Prerequisite: LING 5520. May be repeated for a maximum of 12 credits.

Examination and discussion of classic articles in syntactic theory; presentation of ongoing student research.

#### 6520. Problems in Syntax

Three credits. Prerequisite: LING 5520. May be repeated for a maximum of 12 credits.

Advanced work in syntax.

#### 6530. Comparative Syntax

Three credits. Prerequisite: LING 5520. May be repeated for a maximum of 12 credits.

Cross-linguistic study of syntactic structure; implications for linguistic theory.

#### 6610. Methods in Experimental Syntax

Three credits.

An introduction to the design and analysis of experiments in syntax.

**6798. Special Topics in Linguistics**

Three credits. Prerequisite: LING 5310 and 5510. May be repeated for a maximum of 12 credits.

Topics in general linguistics at an advanced level.

**6799. Independent Study in Linguistics**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit with change in content.

**6899. Directed Research in Linguistics**

Variable (1-6) credits. May be repeated for a maximum of nine credits.

Independent study.

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## Literatures, Cultures, and Languages (LCL)

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**5010. Film Theory and History**

Three credits.

Advanced study of world cinema through film history and theory in an interdisciplinary context. Discussion on all national cinemas, for example: French Cinema, German Cinema; and film genres: for example: Film Noir, The Western, Political Film, Documentary, among others.

**5020. Digital Humanities, Media Studies, and the Multimodal Scholar**

Three credits.

An introduction to digital methods and media theory in the humanities. Research, debate and practice of multimodal forms of scholarship in literary studies.

**5030. Methods and Approaches to Second Language Acquisition**

Three credits. Prerequisite: Open only to Literatures, Cultures and Languages graduate students, others with consent.

Approaches to foreign language teaching and learning. Focus on the nature of language learning and methods and approaches to teaching.

**5040. Introduction to Literary and Cultural Theory**

Three credits. Prerequisite: Open only to graduate students in Literatures, Cultures and Languages; others with instructor consent.

A broad introduction to the historical, interdisciplinary, and contemporary theoretical parameters and models in literary, visual and cultural studies.

**6010. Fields and Research in Language, Culture and Literature Studies**

One credit. Prerequisite: Open only to Literatures, Cultures and Languages graduate students, others with consent. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Theory and practice of research methods in the fields of literature, language and culture.

**6020. Advanced Theory for the Study of Literatures, Cultures and Languages**

Three credits. Prerequisite: Open only to Literatures, Cultures and Languages graduate students, others with consent.

Historical interdisciplinary and contemporary theoretical parameters and models in literary, visual and cultural studies at the advanced level.

**6030. Scholarship and the Profession**

Three credits. Prerequisite: Open only to Literatures, Cultures and Languages graduate students, others with consent.

Critical reflection on the academy and a variety of professional careers, as well as practical instruction in source gathering, grant writing, conference presentation, publication, networking, and employment.

**6040. Interdisciplinary Seminar**

Three credits. Prerequisite: Open only to Literatures, Cultures and Languages graduate students, others with consent. May be repeated for a maximum of nine credits.

An interdisciplinary LCL seminar team-taught by at least two faculty with different areas of specialization within LCL. Variable topics, depending on the interests of the faculty. Offered once a year (fall or spring) with change of topic. Although the course will be taught in English in order to facilitate working across different languages, students will be expected to do research and and/or write seminar papers in the language(s) of their specialization, as appropriate. Candidates for the Ph.D. in Literatures, Cultures and Languages will be required to complete at least one such interdisciplinary seminar before advancing to candidacy.

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## Management (MGMT)

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**5138. Managing Organizations**

Three credits. Prerequisite: Open only to MBA students, others with consent. Not open for credit to students who have passed MGMT 5183.

Today's business climate demands that organizations and their managers be innovative, flexible, adaptive, and capable of maximizing the contributions of all their members. In addition, effective managers must possess the leadership and team skills necessary to manage an increasingly diverse work force. This course examines topics such as leadership, motivation, team dynamics, organization structure, design and culture, conflict, power and politics.

**5181. Value Creation and Competition**

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open for credit to students who have passed BLAW 5182.

Analysis of the challenges inherent in navigating competitive markets with the objective of adopting strategies to achieve value creation, and assess the fit between internal capabilities and the competitive landscape to identify and plan for potential threats and opportunities from environmental change.

**5182. Motivating Individuals and Teams**

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open to students who have passed BLAW 5182.

Development and improvement of "people skills" as they relate to managing individuals and teams in organizations. Prepares students to understand how to best organize and motivate the human capital of the firm, how to solve problems effectively, influence the actions of individuals and lead successful teams. Topics include personality, perceptions and perceptual distortions, decision making, developing a motivational climate and effective incentive systems, creative problem

solving, managing conflict and negotiations, designing and managing diverse teams and team processes. Through the use of experiential exercises and role-playing, participants are given a "hands-on" opportunity to practice and refine their management skills as well as to gain significant insight into their own strengths and weaknesses as a manager.

**5183. Organizational Behavior in Context**

1.5 credits. Prerequisite: MGMT 5182.

Builds upon the individual and team managerial skills developed in MGMT 5182 by focusing on "people skills" as they relate to managing oneself and others within an organizational context. Prepares students to navigate and succeed in a complex organizational environment. Topics include organizational design, culture managing diversity, understanding and managing social networks, power, politics, and organizational communications. Through the use of cases, experiential exercises and role playing, participants are given a "hands-on" opportunity to practice and gain insight into their managerial skills as they pertain to the larger organizational context.

**5184. Strategic Fit and Coordination**

1.5 credits. Prerequisite: MGMT 5181.

Focus on the needs of key organizational stakeholders and the understanding the impact of decisions by individual functional areas on the entire organization. Students will draw upon knowledge from multiple academic disciplines to develop organizational strategies, designs, and resource allocations that can improve firm performance from a holistic perspective.

**5223. Managing Innovation and Change**

Three credits. Prerequisite: MGMT 5138 or 5183, either of which may be taken concurrently; open only to MBA students, others with consent.

Students will learn both the theory and practice underlying successful organizational change, providing them with the understanding necessary to become effective change agents. Addresses such topics as assessing organizational effectiveness and performance, fundamental organizational development techniques, change methodologies, individual, group, and organizational change processes, applied research methods for analysis of change problems, process interventions, the power and politics of change, and strategic change.

**5250. Consultative Management for Business Function Professionals**

Three credits.

Introduces students to the consultative style of management required for functional professionals to be effective with their internal clients. Draws on a wide range of management theory and practice to help students develop the interpersonal, analytical, and technical skills required for consultative contributions. Addresses such topics as relationship and internal client management, intervention frameworks and their application, project management, ethical issues in consulting, and implementation issues.

**5335. Venture Planning, Management, and Growth**

Three credits. Prerequisite: MGMT 5183 or 5138, either of which may be taken concurrently; open only to MBA students, others with consent.

Presents students with an opportunity to put all of their business skills to the test as they prepare and pitch their business plans, while also exposing them to multiple facets of starting and managing new ventures in a very hands-on fashion. The business plans will concentrate on the fundamentals of building a great business, including the business proposition, the business model, the customer, the product, the competition, the market, the industry, the channels of distribution, the selling cycle, and funding requirements, etc. Through a business simulation, students are concurrently placed into a very realistic business setting where they start-up and run a company. Students are given full control of the simulated business and must manage its operations through several decision cycles, challenged with business fundamentals and the interplay between marketing, manufacturing, finance, accounting, etc., as they manage and grow the business.

#### **5377. Human Resource Metrics and Talent Analytics**

Three credits.

Creating and managing appropriate metrics is vital to enabling the development of high-achieving people in organizations and maintaining an effective human resource function. Introduces techniques for developing effective metrics and identifies connections between human resource metrics and other performance measurement systems commonly used in organizations. Introduces students to talent analytics, the tools and techniques managers use to mine organizational data in pursuit of actionable knowledge. Students learn how to structure research questions, communicate data needs to technical specialists, and interpret data to yield organizational insights and support effective decisions.

#### **5401. Managing Risk in the Workplace**

Three credits.

Successful professionals evaluate business issues with proper consideration of organizational risk. Risk is defined as the likelihood of unfavorable outcomes with respect to the organization's process, financial, reputational, competitive market, and people outcomes. The class examines risk-related challenges linked to workplace activities and issues including employee separation, hiring, promotion, employment laws, regulations, interpersonal conflicts, employee privacy, workplace safety, intellectual property and data security.

#### **5420. Employee and Labor Relations**

Three credits.

Examines the broad range of concepts and practices that arise out of the relationship between an organization and its employees. Covers the core topics of labor relations, including organizing, collective bargaining, and the grievance process. Examines trends in unionization and the impact of these trends on employees and organizations. Also examines broader employee relations issues such as managing diversity, arbitration/mediation, downsizing, performance appraisal, implied contracts, and statutory rights.

#### **5615. Leadership**

Three credits. Prerequisite: MGMT 5183 or 5138, either of which may be taken concurrently; open only to MBA students, others with consent.

Exposes students to current thinking and research on leadership, to help students develop new ways of viewing the leadership process, and to examine characteristics of effective and ineffective leadership.

#### **5620. Project Leadership and Communication**

Three credits. Prerequisite: Not open to MBA students.

Comprehensive and in-depth coverage of project leadership and communication designed to increase the student's ability to be a successful project manager. It covers critical competencies for leadership, critical components of communication, key roles involved in taking charge of an organization, building and using networks, motivation and influence, and authority and non-authority bases for power. Students will identify ways to further develop their own leadership potential and their own communication style.

#### **5634. Opportunity Generation, Assessment, and Promotion**

Three credits. Prerequisite: MGMT 5183 or 5138, either of which may be taken concurrently; open only to MBA students, others with consent.

Hands-on experience in opportunity development, exposing students to three distinct modules. The first, creativity and innovation, stimulates the flow of ideas. The second, feasibility analysis, runs these ideas through a comprehensive assessment framework. The third module, getting the first customer, focuses on the initial sales and marketing process needed to get the idea off the ground. At the end of the course, students will be able to identify, evaluate, and shape new business opportunities; effectively present and sell their ideas to critical constituencies; manage the resource constraints associated with launching new ventures.

#### **5637. Organization Behavior**

Three credits. Prerequisite: Open only to MBA and MPS students.

Divided into two major components: micro and macro organization behavior. The first component focuses on individual and group-level problems and the second focuses on organizational-level problems, as they relate to improving organizational performance. This course introduces some of the central topics in management theory, research, and practice and provides the basis for understanding and evaluating organizations and their management.

#### **5639. Diversity and Inclusion**

Three credits.

The globalization of product, labor, and capital markets has led to significant changes in the demographic composition of the international labor force. This course chronicles and examines the transition that is taking place in the global workforce due to the increased diversity in employees on the basis of personal characteristics such as sex, race/ethnicity, and national origin. Examines how employers respond to these new workforce realities and how workforce inclusion strategies can contribute to positive outcomes for employers, employees and their families, and other stakeholders.

#### **5640. International Business**

Three credits. Prerequisite: MGMT 5138 or 5183, either of which may be taken concurrently; open only to MBA students, others with consent.

The growing impact of a rapidly changing international business environment on organizations today means that few managers can afford to remain indifferent to the issues of international business. It is important to understand the changing patterns of international business, the dynamics of international competition, government-business interactions in other countries, and the organizational challenges of managing strategically across borders. This course addresses these issues through an applied approach in the discussion of cases.

#### **5650. Interpersonal Relations, Influence, and Ethical Leadership**

Three credits. Prerequisite: MGMT 5138 or 5183, either of which may be taken concurrently; open only to MBA students, others with consent.

Communication challenges and difficult conversations faced by business professionals. Emphasizes core values associated with ethical leadership in the professional world with a particular focus on the connections between applied ethics and management issues. Topics include conflict resolution styles and models, negotiation, organizational politics, influencing processes, the language of leadership, and models for examination and resolution of ethical workplace dilemmas.

#### **5672. Leading Yourself**

Three credits. Prerequisite: MGMT 5138 or 5183; open only to MBA students, others with consent.

Human resources professionals and managers who understand their own management skills and style are more effective in achieving their personal and professional goals. To help build student self-awareness, the class introduces and employs assessment instruments commonly utilized by business leaders. Students learn to give and receive feedback, build skills inventories and develop personal growth and career development plans, goals and strategies.

#### **5674. Negotiation Strategies**

Three credits. Prerequisite: MGMT 5138 or 5183, either of which may be taken concurrently; open only to MBA students, others with consent.

Effective negotiations skills are essential for successful managers in complex contemporary organizations characterized by changing structures, temporary task forces, multiple demands on resources, and the increased importance of interdepartmental cooperation. Critical negotiation situations with other organizations range from those dealing with labor unions, purchasing, mergers, acquisitions, and joint ventures. During this course, participants plan and conduct negotiations simulations and receive feedback on their performance.

#### **5675. Business Acumen and Strategic Human Resource Management**

Variable (1-3) credits. May be repeated for a maximum of three credits.

Business acumen involves understanding and managing a business situation in a manner that is likely to lead to a good outcome. Human resources managers need the capability to evaluate

multiple dimensions of complex business issues and to understand their implications for a range of stakeholders. In pursuit of these objectives, the course examines the role of HRM activities in organizational strategy design and execution. Specific topics include identification of human capital as a firm resource, understanding employee value propositions and the role of human resources in creating value for customers and other stakeholders.

#### **5676. Human Capital and Workforce Capability Development**

Three credits.

Students in this course will learn how to assess and develop an organization's human assets. The class explores organizational learning and focuses on specific ways in which learning is achieved through training and development activities. Students study human resources trends such as increasing competition, globalization, technological complexities, regulation, and dynamic labor markets, and how these issues interact with increasing demands on workforce productivity. Topics include learning strategy development, training needs assessment, training program design, training techniques, evaluation strategies, and career development practices.

#### **5678. Total Rewards and Performance Management**

Three credits.

Explores the concept of total rewards, its fundamental elements, and strategic prevalence in attracting, motivating and retaining valued employees, and its integration with performance management. Topics include job evaluation, pay surveys, compensation plans and structure, individual and group incentives, and employee benefit principles and concepts. Covers the design of incentive plans, including merit pay, bonuses, equity awards, gain sharing, profit sharing, piece rate, tipping, and commission systems. Students will participate in strategic goal and program development, examining how total rewards, compensation, and benefit design impact performance and contribute to defining organization culture.

#### **5680. Talent Management Through the Employee Lifecycle**

Three credits.

One of the primary responsibilities of human resources is managing talent throughout the employee lifecycle. Talent management spans recruiting, hiring, retention, and separation and requires a keen awareness of individual and organizational issues and strategies. Topics covered include recruitment, selection, on-boarding, career planning, job/competency analysis, benefits administration, retention, retirement, voluntary and involuntary separation, and downsizing.

#### **5800. Strategy, Policy, and Planning**

Three credits. Prerequisite: MGMT 5138; open only to MBA students who have completed at least 42 credits with a GPA of 3.0 or better in graduate-level courses. Not open to students who have passed MGMT 5184.

Capstone course dealing with the two major aspects of strategy: formulation and implementation. Strategy formulation examines such issues as environmental threats and opportunities, the values and priorities of

management and societal stakeholders, and the strengths of company resources and competencies relative to principal competitors. Strategy implementation covers such topics as strategic leadership, organizational structure, resource allocation, and building a strategy-supportive culture. Uses cases and readings to develop the knowledge and skills necessary to prepare students to deal with strategic issues. The student must have completed basic courses in the functional areas of business in order to be ready to assume the holistic perspective required of those who address this important topic.

#### **5805. Human Resource Management Capstone**

Three credits. Prerequisite: Open only to Human Resource Management MPS students.

Hands-on experience in the development of an HR related initiative within students' work organization. Students will diagnose a problem or opportunity that needs to be addressed, identify specific cause and effect relationships driving current unsatisfactory outcomes, and build evidence in support of their causal theories. Students create guidelines to steer their change plans including identifying clear objectives, determining boundaries of the challenge, and explaining how changes can lead to desired outcomes. In the final stage of the project, students develop a coherent set of change actions expected to lead the organization from its current performance to its desired future outcomes. This course should be taken at the conclusion of the students' HRM program.

#### **5893. Management Internship**

Three credits. Prerequisite: Instructor consent.

The application and implementation in a work situation of theories and practices related to the student's area of specialization, facilitated by the student, sponsoring organization, and faculty advisor. Among other course assessments to be determined by the faculty advisor, a comprehensive project is required.

#### **5894. Seminar**

Variable (1-3) credits. Prerequisite: MGMT 5138 or 5183; open only to MBA students; instructor consent required. May be repeated for a maximum of 12 credits.

Investigation and discussion of special topics in management.

#### **5895. Special Topics in Management**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

Faculty-student interaction on a one-to-one basis involving independent study of specific areas of management. Emphasis, selected by the student, may be on theoretical or applied aspects. A written report is required.

#### **6200. Directed Readings in Special Topics**

Variable (1-6) credits. Prerequisite: Open only to Business Administration Ph.D. students. May be repeated for a maximum of 12 credits.

#### **6201. Seminar in Organizational Behavior**

Three credits.

A survey of research in organizational behavior and theory. Topics include learning and cognition in organization, attribution theory, satisfaction and performance, leadership, motivation and group dynamics.

#### **6202. Research Methods in Strategic Management**

Three credits.

An in-depth review of the content of policy research. Covers several "streams" of research currently popular in the strategic management literature. Also the major findings within each stream.

#### **6203. Contemporary Research in Organizational Behavior**

Three credits.

Focus is on several of the contemporary research themes popular in Organization Behavior. Students critique the methodology and future potential of each theme.

#### **6204. Seminar in Strategic Management**

Three credits.

Reviews the research of strategic management that emphasizes macro explanatory models. Students review recent dissertations and critique the content and methodology of each.

#### **6206. Applied Research in Management**

Three credits.

Students, individually or in groups, formulate, conduct and prepare a written report in publishable format on a research project pertaining to the area of management. Meetings will be devoted to discussion of issues which arise in the conduct of student projects and to presentation of projects.

#### **6405. Research Design**

Three credits.

Examination of research methods utilized in management research. Topics include the laboratory-field distinction, randomized experiments in field settings, content analysis and interrater reliability, log-linear analysis, instrument design and reliability analysis, survey design and sampling techniques, meta-analysis, quasi-experimental design, nonequivalent group design, interrupted time-series design and correlational analysis.

#### **6408. Seminar in Strategic Entrepreneurship, Innovation, and New Ventures**

Three credits. Prerequisite: Instructor consent.

Major theoretical and empirical issues in the area of strategic entrepreneurship, innovation, and new ventures. The construction and testing of theory regarding the generation, identification, assessment, and capture of opportunities that support the expansion of existing ventures or formation of new businesses. Includes an overview of the field; generation and identification of entrepreneurial opportunities; entrepreneurial thinking and the associated decisions to explore and exploit; and influences on and processes associated with innovation management and venture creation.

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### **Marine Sciences (MARN)**

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#### **5010. Biological Oceanography**

Three credits. Not open for credit to students who have passed MARN 4010.

Structure and function of marine food webs, from primary producers to top trophic levels; interaction of marine organisms with the environment; energy and mass flow in food webs; elemental cycling; coupling between pelagic and benthic environments.

**5012. Marine Invertebrate Biology**

Three credits. Prerequisite: Instructor consent.

Comparative examination of major adaptations and functional responses of marine invertebrates to biotic and abiotic factors in the marine environment. Field trips required.

**5014. Marine Phytoplankton Ecology and Physiology**

Three credits.

The physiology of marine phytoplankton, environmental factors affecting their growth and photosynthesis in the ocean, the oceanographic processes responsible for the temporal and spatial distributions of phytoplankton biomass and production, and current topics in phytoplankton research.

**5015. Molecular Approach to Biological Oceanography**

Three credits.

Principles and technology in nucleic acid purification and manipulation, DNA fingerprinting, gene cloning and sequencing, phylogenetic analysis, and detection of gene expression (mRNA and protein). Application examples in marine ecological studies.

**5016. Marine Zooplankton**

Three credits. Prerequisite: EEB 2244 or 2245, or MARN 5010; instructor consent.

Bioenergetics, life history, population and community ecology of zooplankton, and role of zooplankton in aquatic biogeochemical cycles.

**5017. Plankton Ecology**

Three credits. Prerequisite: Instructor consent. Recommended preparation: the equivalent of one year of biology, chemistry and physics courses.

Ecology of planktonic organisms (bacteria, protista and metazoa). The evolutionary ecology concept, methods of research, special features of aquatic habitats; adaptations to aquatic environments; population biology; predation, competition, life histories, community structure, and role of plankton in ecosystem metabolism.

**5018. Ecology of Fishes**

Three credits.

General concepts in fish ecology such as distribution, feeding, bioenergetics, growth, larval fish ecology, biotic interactions, life history evolution and other contemporary research topics.

**5030. Chemical Oceanography**

Three credits.

Composition, origin and solution chemistry of seawater and the marine biogeochemical cycles of salts, elements and gases. Distributions and transfer in the marine environment through chemical equilibria, rates, redox, partitioning, ocean circulation, biological cycles and crustal exchanges.

**5031. Aqueous Geochemistry**

Three credits.

Application of chemical theory (thermodynamic equilibrium approaches and kinetics) to understanding the geochemistry of the Earth's aqueous systems, with a focus on the ocean and coastal ecosystems.

**5032. Coastal Pollution and Bioremediation**

Three credits.

Overview of processes and compounds leading to pollution in the nearshore marine environment. The impact of pollution on the marine food web and its response is emphasized. Alleviation of pollution through metabolism of organisms, including bacteria, seagrasses and salt marshes.

**5033. Marine and Atmospheric Processes of Global Change**

Three credits.

Fundamentals of marine and atmospheric processes in global biogeochemistry. Evaluation of atmospheric, biological and chemical processes that contribute to global change.

**5036. Advanced Chemical Oceanography**

Three credits.

Major global biogeochemical cycles of the major elements, nutrients, gases, organic matter, and trace elements and the impact of climate change and ocean acidification. Biogeochemical cycling of toxic trace metals, and transfer of substances at the air and sediment interfaces.

**5050. Geological Oceanography**

Three credits.

Concepts in geological oceanography, including the role of plate tectonics in the control of the Earth and ocean system, fundamentals of biosphere-geosphere interaction over geologic timescales, and the reconstruction of past climates using marine sediment archives.

**5060. Dynamic Physical Oceanography**

Three credits.

Global energy balance. General circulation in the oceans and atmosphere. Thermodynamics and stability. Fundamental fluid mechanics. Surface gravity waves. Geophysical fluid mechanics. Tides and other long waves. Theories of global circulation.

**5061. Advanced Dynamical Oceanography**

Three credits. Prerequisite: MARN 5060; instructor consent.

Ocean thermodynamics; dynamics of rotating; homogeneous fluids; ocean circulation; western boundary currents; the thermocline, oceanic fronts.

**5064. Air-Sea Interaction**

Three credits. Prerequisite: MARN 5060.

Processes controlling the exchange of momentum, heat and mass across the air-sea interface. Topics include atmospheric and oceanic stratification, wind-wave-current interaction, wave breaking, bubble generation, heat budgets, flux parameterizations and instrumentation.

**5065. Physical Oceanography**

Three credits.

Overview of physical properties and dynamics influencing the oceans and coastal waters. Descriptions of global water property distributions, surface mixed layer, pycnocline, surface heat fluxes, and major ocean currents. Introduction to dynamics of ocean circulation, waves, tides, and coastal circulation.

**5066. River Influences on the Marine Environment**

Three credits. Recommended preparation: calculus and general physics.

Influences of rivers on estuaries, coastal and open ocean water properties, energy budgets and ecosystems including inputs of buoyant waters,

sediments and pollutants and variability from storms, seasons, human alterations and climate change.

**5067. Synoptic Meteorology**

Three credits.

Fundamental processes of atmospheric synoptic meteorology, including the governing equations of motion, atmospheric stability, quasi-geostrophic theory, extratropical cyclogenesis, and frontogenesis.

**5200. Oceanographic Data Analysis**

Three credits.

Programming, data input/output, and graphing with advanced scientific analysis software. Analysis of temporal and spatial patterns in oceanographic datasets using multivariate regression, harmonic analysis, Fourier and wavelet transforms, empirical orthogonal functions, and three-dimensional mapping.

**5500. Professional Development in Marine Sciences**

Three credits.

Survey of practical skills required for professional integration into the scientific community, including proposal writing, scientific and public presentations, manuscript preparation and publication, scientific peer review, resume building, and interview skills.

**5501. Marine Sciences Seminar**

Two credits. May be repeated for a maximum of six credits.

Intensive reading, evaluation and critical discussion of current interdisciplinary topics presented at weekly departmental research seminars.

**5812. Seminar in Marine Biodiversity and Conservation**

Three credits. Not open to students who have passed MARN 3812.

Critical examination of state-of-the-art research, policy and regulatory frameworks of marine conservation biology and associated environmental, cultural, and socio-economic implications. Topics may include aquaculture, endangered species, strandings, biomedicine, ocean pollution, and marine protected areas. Research projects to be conducted at Mystic Aquarium.

**5830. Seminar in Oceanography**

Two credits. Prerequisite: Instructor consent. May be repeated for a maximum of eight credits.

Readings and discussions of current literature in oceanography. Topics vary each semester: Biological, Chemical, Physical, Geological.

**5893. Research**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Field and laboratory research covering selected topics of marine sciences.

**5895. Independent Study**

Variable (1-6) credits. Prerequisite: Instructor consent.

A reading course for pursuing specialized work in marine sciences. Open to undergraduate students with permission. Designate the field of special interest by use of the appropriate section symbol.

**5899. Independent Study**

Variable (1-6) credits. May be repeated for credit with change in content or instructor.

Independent study under the direction of a faculty member.

**5995. Special Topics**

Variable (1-6) credits. May be repeated for credit with change in content.

**6001. Mathematical Models in Marine Sciences**

Two credits. Prerequisite: At least nine credits of Marine Sciences graduate courses.

Examples of the formulation of quantitative models of marine systems with a review of some particularly useful mathematical methods (differential equations, operational methods, numerical solution techniques), emphasizing the computation of predictions.

**6002. Mathematical Models in Marine Sciences: Practicum**

Two credits. May be repeated for a maximum of eight credits.

Individual term projects relating to mathematical modeling in the marine sciences.

**6010. Advanced Biological Oceanography -- Pelagic Processes**

Three credits.

Pelagic communities, ecosystem structure and function, bioenergetic constraints, population dynamics, consequences of global climate and environmental change, and advances in the field driven by technological innovation.

**6011. Advanced Biological Oceanography - Benthic Processes**

Three credits. Prerequisite: MARN 5010 or instructor consent.

Physical and physiological constraints on the benthos, benthic-pelagic coupling, species interactions, community assembly and dynamics, and anthropogenic impacts.

**6031. Stable Isotope Biogeochemistry**

Three credits. Prerequisite: MARN 4030W or 5030 or instructor consent.

Overview of important stable isotopic systems used to study biogeochemical cycling of bioactive elements. Focus will be on carbon, nitrogen, and oxygen isotopic systems with an introduction to sulfur, silicic acid, and trace metals.

**6088. Variable Topics**

Variable (1-6) credits. May be repeated for credit with change in content.

## Marketing (MKTG)

**5115. Marketing Management**

Three credits. Prerequisite: Open only to MBA students, others with consent. Not open to students who have passed MKTG 5182.

A strategic and analytical approach to marketing decisions. Students will develop basic proficiency with key marketing concepts and skills including: identifying opportunities and threats in the market environment; forecasting market growth; evaluating customers and competitors; segmenting, targeting, and positioning; determining product, price, place and promotion components of marketing strategies; and assessing marketing performance.

**5181. Customer Insights and Marketing Opportunity**

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open to students who have passed MKTG 5182.

A strategic and analytical approach to marketing decisions. Students will develop basic proficiency with key marketing concepts and skills including: identifying opportunities and threats in the market environment; forecasting market growth; evaluating customers and competitors; and segmenting, targeting, and positioning.

**5182. Managing and Delivering Customer Value**

1.5 credits. Corequisite: MKTG 5181.

Builds on the strategic perspective developed in MKTG 5181. Students will learn how to determine product, price, place and promotion components of marketing strategies and how to assess marketing performance.

**5220. Big Data and Strategic Marketing**

Three credits. Prerequisite: MKTG 5115 or MKTG 5181 and 5182; OPIM 5103 or 5603, or BADM 5180 and 5181.

Offers students the tools to analyze "big" data, to identify patterns that have actionable marketing value. Students will gain hands-on exposure to advanced analytical tools such as neural networks, market basket analysis, sequence detection, text mining, and use of state-of-the-art business modeling software to apply course concepts. Applications include financial services, retail, advertising, insurance, health care and human resources. Directed at students preparing for positions in digital analytics, digital marketing, marketing research, and consulting.

**5230. New Product and Service Innovation Management**

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182.

Framework and analytical tools for managing innovation based on best practices and research evidence. Students will learn how to enhance opportunities for innovation, how to identify ideas to pursue, how to integrate marketing and R&D in new product/service development, how to forecast sales, how to accelerate the new product process from design to commercialization, and how to make product investment decisions in both mature and emerging technologies under conditions of uncertainty. Directed at students preparing for positions in product management, product development and innovation, and consulting.

**5250. Marketing Research and Intelligence**

Three credits. Prerequisite: MKTG 5115 or MKTG 5181 and 5182; OPIM 5103 or 5603, or BADM 5180 and 5181.

Introduction to methods and techniques used to gain customer and market insights through marketing research. Students will learn how to identify the most appropriate research techniques to answer particular marketing questions, how to design studies for maximum insight, and how to analyze and critically read results. Qualitative and quantitative approaches will be covered. Directed at students preparing for positions in marketing research, digital analytics, consulting, product and brand management, and product development and innovation.

**5251. Marketing and Digital Analytics**

Three credits. Prerequisite: MKTG 5115 or MKTG 5181 and 5182; OPIM 5103 or 5603, or BADM 5180 and 5181.

Provides a framework for using website and social media analytics tools to support marketing decisions. Students will gain hands-on experience using basic and advanced analytical tools to analyze markets, gain insights from social media and respond in real time to online consumer behavior, forecast sales, profile and target customers, and develop pricing and promotion strategies. Directed at students preparing for positions in digital analytics, digital marketing, consulting, product and brand management, customer management, and integrated marketing communications.

**5625. Marketing for Global Competitiveness**

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182.

A dynamic approach to competitive marketing strategy in domestic and global markets. Students will learn how to analyze customers and competitors and how to conduct country and product portfolio analysis to develop effective strategies over the product life cycle and in different global markets. Strategies for market pioneers, late entrants, mature, and declining markets, as well as perspectives on the effects of cultural, political, economic, and institutional factors, are covered. Directed at students preparing for positions in global marketing strategy, consulting, and product and brand management.

**5640. Integrated Marketing Communications in the Digital Age**

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182.

A strategic approach to the design, coordination, integration, and management of marketing communications. Students will develop an integrated marketing communications campaign using traditional, social, and mobile media with an emphasis on the competitive and strategic value of communications in the marketplace. Directed at students preparing for positions in integrated marketing communications, digital marketing, product and brand management, and customer management.

**5650. Strategic Brand Management**

Three credits. Prerequisite: MKTG 5115 or MKTG 5181 and 5182; OPIM 5103 or 5603, or BADM 5180 and 5181.

Provides an advanced understanding of customer behavior to build, leverage, and enhance brand equity. Students will learn how to strategically position brands; build and leverage brand communities; measure brand assets and brand performance; and manage domestic and global brands and brand extensions. Directed at students preparing for positions in product and brand management, integrated marketing communications, digital marketing, and consulting.

**5655. Pricing and Revenue Management**

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182.

The strategy and tactics of pricing, with an emphasis on revenue management. Students will learn how to develop dynamic pricing strategies that account for changing customer demand, differences across customer segments and markets,

competitive pricing strategies, and the role of pricing in loyalty programs, managing product inventory, and price-quality relationships. Students use analytic tools to apply course concepts to revenue management. Directed at students preparing for positions in product and brand management, digital analytics, and consulting.

#### **5660. Customer Insights**

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182.

A systematic framework for understanding consumer and business buying behavior to inform marketing decisions. Students will examine internal and external influences on behavior including information search, choice processes and biases, product usage, satisfaction, loyalty, and word-of-mouth. Directed at students preparing for positions in product and brand management, digital marketing, integrated marketing communications, and marketing research.

#### **5665. Digital Marketing**

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182.

A framework for developing marketing strategies in digital environments. Students will learn how to develop integrated digital marketing management strategies in pursuit of long-term marketing objectives. Directed at students preparing for positions in digital marketing, digital analytics, brand and customer management, integrated marketing communications, and consulting.

#### **5894. Seminar**

Variable (1-6) credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182. May be repeated for credit.

Investigation and discussion of special topics in marketing.

#### **5895. Special Topics in Marketing**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Faculty-student interaction on a one-to-one basis involving independent study of specific areas of marketing. Emphasis, selected by the student, may be on theoretical or applied aspects. A written report is required.

#### **6200. Investigation of Special Topics**

Variable (1-6) credits. Prerequisite: Open only to students in the Marketing doctoral program. May be repeated for credit.

#### **6202. Introduction to Consumer Behavior**

Three credits. Prerequisite: Instructor consent.

Major research topics in consumer behavior, such as theory development and testing, judgment and decision-making, information search, memory, attitude theory, learning, group and interpersonal influence.

#### **6203. Introduction to Quantitative Applications in Marketing**

Three credits. Prerequisite: Instructor consent.

Techniques and concepts of quantitative marketing modeling. Topics would typically cover: empirical models such as brand choice models, purchase quantity models, purchase timing models, related estimation issues such as heterogeneity and endogeneity, basic microeconomic and industrial organization models, and the use of such models

in marketing applications such as pricing, channel strategies, customer word-of-mouth and retail competition.

#### **6209. Introduction to Research in Marketing**

Three credits. Prerequisite: Instructor consent.

Introduces the contents and nature of academic marketing research. Topics typically include: an introduction to the area of marketing, theory development in marketing, research and the research process in marketing, a typology of research areas in marketing, a survey of research techniques in marketing (including qualitative, experimental, survey based, econometric, and analytical), and a survey of the base disciplines upon which marketing draws for theory (psychology, economics, and sociology).

#### **6210. Strategic Applications in Marketing**

Three credits. Prerequisite: Instructor consent.

This survey course acquaints students with the state of the art in strategic marketing. Topics are subject to change at the discretion of the instructor, but would typically cover strategic issues related to products, firms, customers and competition.

#### **6211. Multivariate Analysis in Marketing**

Three credits.

An overview of various multivariate statistical methods. Topics are subject to change at the discretion of the instructor, but would typically cover: discriminant, canonical, cluster, and factor analysis; multidimensional scaling; and conjoint, logit, probit and tobit analysis. Hands on experience in use of these methods will be provided; the primary focus will be on marketing applications.

#### **6212. Socio-cultural Aspects of Consumer Behavior**

Three credits. Prerequisite: Instructor consent.

The socio-cultural aspects of consumer behavior, such as consumer identity, consumption signs and symbols, cross-cultural consumption, class, culture and consumption, consumption practices, transformative consumer research, and historical and ethnographic perspectives on consumer behavior.

#### **6213. Advanced Quantitative Applications in Marketing**

Three credits. Prerequisite: MKTG 6203 or the equivalent as determined by the instructor.

Advanced topics and recent developments in quantitative marketing. Current topics may include dynamic structural models, numerical dynamic programming, learning models, entry and exit, and multi-category models. Students use these models and methods with empirical data to address marketing problems.

#### **6296. Special Topics: Progress toward Qualifying Paper**

Three credits. Prerequisite: Open only to students in the Marketing doctoral program.

Independent study under faculty supervision in area chosen for doctoral student's qualifying paper. Satisfactory progress on qualifying paper (including literature review and research conceptualization) is required. Student can also develop research design, conduct pilot studies, refine questionnaires and measures, or develop a framework for model specification and model estimation. A written report is required.

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## **Materials Science and Engineering (MSE)**

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### **5001. Principles of Materials Engineering**

Three credits.

Accelerated Introduction to Materials Science and Engineering Concepts, including: structures and defects; phase diagrams; mechanical properties; electronic properties; magnetic properties; optical properties; thermal properties; functional materials; metals and alloys; ceramics; polymers; and composites.

### **5095. Independent Study**

Variable (1-3) credits.

Independent study.

### **5301. Thermodynamics of Materials**

Three credits.

Classical thermodynamics with emphasis on solutions and phase equilibria. Applications to unary and multicomponent, reacting and nonreacting, homogeneous and heterogeneous systems, including development of phase diagrams.

### **5305. Phase Transformations in Solids**

Three credits.

Thermodynamics, kinetics and crystallography of phase transformations. Nucleation and growth kinetics. Order-disorder, ferroelectric, and ferromagnetic transformations.

### **5307. Solidification of Metals and Alloys**

Three credits. Prerequisite: MSE 5301.

Thermodynamic and kinetic principles of solidification. Control of structure and properties of pure and multicomponent materials through casting and solidification processes. Application of solidification principles to shaped casting, continuous casting, crystal growth and particulate processes.

### **5309. Transport Phenomena in Materials Science and Engineering**

Three credits.

Mechanisms and quantitative treatment of mass, energy, and momentum transfer will be discussed in the context of materials science and engineering applications. Increasingly complex and open-ended applications will be used to illustrate principles of fluid flow; heat conduction, radiation, and diffusion.

### **5310. Materials Modeling from First Principles**

Three credits. Prerequisite: Instructor consent.

An overview of the theory and practices underlying modern electronic structure materials computations, primarily density functional theory (DFT). Students involved primarily/partially in materials computations, as well as those focused on experimental materials research wishing to learn about DFT techniques will benefit from this course.

### **5311. Mechanical Properties of Materials**

Three credits.

Mechanics of deformation and fracture; dislocation theory; strength of ductile and brittle materials; toughness; strengthening mechanisms; toughening mechanisms; creep mechanisms; fatigue crack initiation and propagation; reliability and lifetime prediction.

**5317. Electronic and Magnetic Properties of Materials**

Three credits.

Crystal structures and interatomic forces, lattice vibrations, thermal, acoustic, and optical properties. Semiconductors, dielectric properties, magnetism, and magnetic properties, superconductivity. Device applications.

**5320. Investigation of Special Topics**

Three credits. May be repeated for a maximum of nine credits.

Special courses or individual readings.

**5322. Materials Characterization**

Three credits.

A review of the principal experimental methods used to reveal the microstructure and chemistry of materials. Diffraction techniques: x-ray, electron, neutron and proton scattering. Photon probes: photon microscopies, x-ray topography and XPS. Electron probes: SEM, TEM, EDX, EELS, AES. Atom and ion probes: RBS, SIMS, FIM, PIXE. Scanned probe microscopies.

**5323. Transmission Electron Microscopy**

Three credits. Prerequisite: MSE 5322 or instructor consent.

Electron beam-specimen interactions. Basics of electron microscopes. Diffraction: theory, types of patterns and interpretation. Imaging: diffraction contrast, phase contrast and other techniques. Spectrometry: x-ray microanalysis and electron energy-loss spectrometry.

**5330. Classical Atomic-level Simulations in Materials Science and Engineering**

Three credits.

Introduction to several classical atomic-level simulation techniques (molecular dynamics, Monte Carlo methods) with an emphasis on learning the art of designing simulations and analyzing data generated. The capabilities of the methods to investigate properties and response of materials and the current limitations of materials at the atomic scales will be covered.

**5334. Structure and Defects in Materials**

Three credits.

Structure of amorphous and vitreous materials. Crystallography: translation symmetry and lattices, point and space groups, use of the International Tables for Crystallography, examples of simple crystal structures. Defects in materials: point defects, line defects, planar defects, homophase and heterophase interfaces. Distributions of structure and defects: an introduction to microstructure.

**5335. High Temperature Materials**

Three credits.

Strength-determining factors in advanced alloys, ceramics and composites. Role of material chemistry and microstructure. High temperature creep and crack growth. Oxidation. Thermomechanical behavior.

**5336. Material Selection in Mechanical Design**

Three credits. Prerequisite: MSE 2101; instructor consent.

Study of materials and how they are chosen for various mechanical designs. A wide range of materials will be discussed (metal, ceramic, polymer, etc.) and their key properties (modulus, strength, density, etc.) in design will be reviewed.

Guidelines for material selection will be shown. Design trades will also be discussed.

**5343. Corrosion**

Three credits.

Mechanisms, characteristics and types of corrosion. Test methods and evaluation of corrosion resistance. Suitability of metals, ceramics, and organic materials in corrosive environments. Oxidation and other high temperature gas-metal reactions.

**5364. Advanced Composites**

Three credits.

Mechanical properties, analysis and modeling of composite materials. The properties treated include stiffness, strength, fracture toughness, fatigue strength and creep resistance as they relate to fiber, whisker, particulate, and laminated composites.

**5366. Alloy Casting Processes**

Three credits.

Principles and practices of alloy solidification and casting processes are discussed and applied in the context of sand, investment, permanent mold and die-casting; continuous and direct chill casting; electroslag and vacuum arc remelting; crystal growth; rapid solidification; and laser coating.

**5370. Ceramics**

Three credits. Prerequisite: A knowledge of Materials Science at the undergraduate level, or MSE 5001.

A graduate-level treatment of the science and engineering of Ceramic Materials. Concepts to be studied include the structure of both crystalline and non-crystalline material, and defects (including point defects, dislocations and interfaces) in these materials. A broad range of special (for ceramics) methods for the preparation, processing and characterization of these materials will run throughout the course. An important component of the course is consideration of how the crystal structure determines or influences mechanical, electronic, magnetic, and thermal properties. Special topics may include functional ceramics, 2D ceramics, and connections between ceramics, economics and global affairs.

**5700. Biomaterials and Tissue Engineering**

(Also offered as BME 5700 and MEDS 5313.) Three credits. Prerequisite: Instructor consent. Recommended preparation: BME 3700.

A broad introduction to the field of biomaterials and tissue engineering. Presents basic principles of biological, medical, and material science as applied to implantable medical devices, drug delivery systems and artificial organs.

**6401. Graduate Seminars in Materials Science and Engineering**

One credit. May be repeated for credit.

Presentations by invited guest speakers on topics of current interest in various areas of Materials Science and Engineering.

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**Mathematics (MATH)**

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**5000. Mathematical Pedagogy**

One credit. Prerequisite: Open to graduate students in Mathematics, others with instructor consent.

The theory and practice of teaching mathematics at the college level. Basic skills, grading methods,

cooperative learning, active learning, use of technology, classroom problems, history of learning theory, reflective practice. May not be used to satisfy degree requirements in mathematics.

**5010. Topics in Analysis I**

Three credits. Prerequisite: Instructor consent. May be repeated for credit with change in content.

Advanced topics in analysis.

**5011. Topics in Analysis II**

Three credits. Prerequisite: MATH 5010; instructor consent. With a change of content, may be repeated for credit.

Advanced topics in analysis.

**5016. Topics in Probability**

Three credits. May be repeated for a maximum of 12 credits with change in content.

Advanced topics in probability theory, theory of random processes, mathematical statistics, and related fields.

**5020. Topics in Algebra**

Three credits. Prerequisite: MATH 5211. May be repeated for credit.

Advanced topics chosen from group theory, ring theory, number theory, Lie theory, combinatorics, commutative algebra, algebraic geometry, homological algebra, and representation theory.

**5026. Topics in Mathematical Logic**

Three credits. Prerequisite: MATH 5260; instructor consent required. May be repeated for credit.

Topics include, but are not restricted to, Computability Theory, Model Theory, and Set Theory.

**5030. Topics in Geometry and Topology I**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits with change in content.

Advanced topics in Geometry and Topology.

**5031. Topics in Geometry and Topology II**

Three credits. Prerequisite: MATH 5030; instructor consent required. With a change of content, may be repeated for credit.

Advanced topics in Geometry and Topology.

**5131. Functional Analysis II**

Three credits. Prerequisite: MATH 5111. With a change of content, may be repeated for a maximum of six credits.

Normed linear spaces and algebras, the theory of linear operators, spectral analysis.

**5040. Topics in Applied Analysis I**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

Advanced topics from the theory of ordinary or partial differential equations. Other possible topics: integral equations, optimization theory, the calculus of variations, advanced approximation theory.

**5041. Topics in Applied Analysis II**

Three credits. Prerequisite: Instructor consent. May be repeated for a maximum of 12 credits.

Advanced topics from the theory of ordinary or partial differential equations. Other possible topics: integral equations, optimization theory, the calculus of variations, advanced approximation theory.

**5046. Introduction to Complex Variables**

Three credits. Not open for credit to students who have passed MATH 3146.

Functions of a complex variable, integration in the complex plane, conformal mapping. Open for master's credit but not doctoral credit toward degree in Mathematics.

#### 5050. Analysis

Three credits. Not open for credit to students who have passed MATH 3150.

Introduction to the theory of functions of a real variable. Open for master's credit but not doctoral credit toward degree in Mathematics.

#### 5070. Topics in Scientific Computation

Three credits. May be repeated for a total of 12 credits.

#### 5110. Introduction to Modern Analysis

Three credits.

Metric spaces, sequences and series, continuity, differentiation, the Riemann-Stieltjes integral, functions of several variables.

#### 5111. Measure and Integration

Three credits. Prerequisite: MATH 5110.

General theory of measure and Lebesgue integration,  $L^p$ -spaces.

#### 5120. Complex Function Theory I

Three credits. Prerequisite: MATH 5110.

An introduction to the theory of analytic functions, with emphasis on modern points of view.

#### 5121. Topics in Complex Function Theory

Three credits. Prerequisite: MATH 5120. May be repeated for credit with a change in content and consent of the instructor.

Advanced topics of contemporary interest. These include Riemann surfaces, Kleinian groups, entire functions, conformal mapping, several complex variables, and automorphic functions, among others.

#### 5130. Functional Analysis I

Three credits. Prerequisite: MATH 5111.

Normed linear spaces and algebras, the theory of linear operators, spectral analysis.

#### 5140. Fourier Analysis

Three credits. Prerequisite: MATH 5111.

Foundations of harmonic analysis developed through the study of Fourier series and Fourier transforms.

#### 5141. Fourier Analysis on Groups

Three credits. Prerequisite: MATH 5111.

#### 5160. Probability Theory and Stochastic Processes I

Three credits.

Convergence of random variables and their probability laws, maximal inequalities, series of independent random variables and laws of large numbers, central limit theorems, martingales, Brownian motion.

#### 5161. Probability Theory and Stochastic Processes II

Three credits. Prerequisite: MATH 5160. May be repeated for a maximum of 12 credits.

Contemporary theory of stochastic processes, including stopping times, stochastic integration, stochastic differential equations and Markov processes, Gaussian processes, and empirical and related processes with applications in asymptotic statistics.

#### 5210. Abstract Algebra I

Three credits.

Group theory, ring theory and modules, and universal mapping properties.

#### 5211. Abstract Algebra II

Three credits. Prerequisite: MATH 5210.

Linear and multilinear algebra, Galois theory, category theory, and commutative algebra.

#### 5220. Introduction to Representation Theory

Three credits. Prerequisite: MATH 5210.

Semi-simple rings, Jacobson radical, density theory, Wedderburn's Theorem, representations and characters of groups, orthogonality relations, Burnside's theorem.

#### 5230. Algebraic Number Theory

Three credits. Prerequisite: MATH 5211.

Algebraic integers, ideal class group, ramification, Frobenius elements in Galois groups, Dirichlet's unit theorem, localization, and completion. Further topics (zeta-functions, function fields, non-maximal orders) as time permits.

#### 5250. Modern Matrix Theory and Linear Algebra

Three credits.

The LU, QR, symmetric, polar, and singular value matrix decompositions. Schur and Jordan normal forms. Symmetric, positive-definite, normal and unitary matrices. Perron-Frobenius theory and graph criteria in the theory of non-negative matrices.

#### 5260. Mathematical Logic I

Three credits. Prerequisite: MATH 5210.

Predicate calculus, completeness, compactness, Lowenheim-Skolem theorems, formal theories with applications to algebra, Godel's incompleteness theorem. Further topics chosen from: axiomatic set theory, model theory, recursion theory, computational complexity, automata theory and formal languages.

#### 5310. Introduction to Geometry and Topology I

Three credits. Prerequisite or corequisite: MATH 5110.

Topological spaces, maps, induced topologies, separation axioms, compactness, connectedness, classification of surfaces, the fundamental group and its applications, covering spaces.

#### 5311. Introduction to Geometry and Topology II

Three credits. Prerequisite: MATH 5310. With a change in content, may be repeated for a maximum of 12 credits.

Smooth manifolds, vector fields, differential forms, de Rham cohomology, homology theory, singular (co)homology, Poincaré duality.

#### 5320. Algebraic Geometry I

Three credits. Prerequisite: MATH 5211; and MATH 5310, which may be taken concurrently.

This course is an introduction to algebraic varieties: affine and projective varieties, dimension of varieties and subvarieties, algebraic curves, singular points, divisors and line bundles, differentials, intersections.

#### 5321. Algebraic Geometry II

Three credits. Prerequisite: MATH 5320.

This course introduces further concepts and methods of modern algebraic geometry, including schemes and cohomology.

#### 5360. Differential Geometry

Three credits.

This course is an introduction to the study of differentiable manifolds on which various differential and integral calculi are developed. The topics include covariant derivatives and connections, geodesics and exponential map, Riemannian metrics, curvature tensor, Ricci and scalar curvature.

#### 5410. Introduction to Applied Mathematics I

Three credits.

Banach spaces, linear operator theory and application to differential equations, nonlinear operators, compact sets on Banach spaces, the adjoint operator on Hilbert space, linear compact operators, Fredholm alternative, fixed point theorems and application to differential equations, spectral theory, distributions.

#### 5411. Introduction to Applied Mathematics II

Three credits.

Banach spaces, linear operator theory and application to differential equations, nonlinear operators, compact sets on Banach spaces, the adjoint operator on Hilbert space, linear compact operators, Fredholm alternative, fixed point theorems and application to differential equations, spectral theory, distributions.

#### 5420. Ordinary Differential Equations

Three credits. Prerequisite: MATH 5111.

Existence and uniqueness of solutions, stability and asymptotic behavior. If time permits: eigenvalue problems, dynamical systems, existence and stability of periodic solutions.

#### 5430. Applied Analysis

Three credits. Not open for credit to students who have passed MATH 3430. May not be used for credit for Mathematics graduate degrees.

Convergence of Fourier Series, Legendre and Hermite polynomials, existence and uniqueness theorems, two-point boundary value problems and Green's functions.

#### 5435. Introduction to Partial Differential Equations

Three credits. Not open to students who have passed MATH 3435. Not open for graduate credit toward degrees in Mathematics.

Solution of first and second order partial differential equations with applications to engineering and science.

#### 5440. Partial Differential Equations

Three credits. Prerequisite or corequisite: MATH 5120.

Cauchy-Kowalewsky Theorem, classification of second-order equations, systems of hyperbolic equations, the wave equation, the potential equation, the heat equation in  $\mathbb{R}^n$ .

#### 5510. Numerical Analysis and Approximation Theory I

Three credits. Prerequisite or corequisite: MATH 5110.

The study of convergence, numerical stability, roundoff error, and discretization error arising from the approximation of differential and integral operators.

#### 5511. Numerical Analysis and Approximation Theory II

Three credits. Prerequisite: MATH 5510.

The study of convergence, numerical stability, roundoff error, and discretization error arising from the approximation of differential and integral operators.

#### **5520. Finite Element Solution Methods I**

Three credits.

Numerical solution of elliptic, parabolic and hyperbolic partial differential equations by finite element solution methods. Applications.

#### **5521. Finite Element Solution Methods II**

Three credits. Prerequisite: MATH 5520.

Numerical solution of elliptic, parabolic and hyperbolic partial differential equations by finite element solution methods. Applications.

#### **5580. Optimization**

Three credits.

Theory of linear programming: convexity, bases, simplex method, dual and integer programming, assignment, transportation, and flow problems. Theory of nonlinear programming: unconstrained local optimization, Lagrange multipliers, Kuhn-Tucker conditions, computational algorithms. Concrete applications.

#### **5600. Fundamentals of Financial Mathematics**

Three credits.

The risk-neutral model for pricing and hedging derivative financial instruments within the context of binomial and trinomial models of the stock price process.

#### **5620. Financial Mathematics I**

Three credits. Not open for credit to students who have passed MATH 2620.

The mathematics of measurement of interest, accumulation and discount, present value, annuities, loans, bonds, and other securities.

#### **5630. Long-Term Actuarial Mathematics I**

Four credits. Prerequisite: MATH 2620 or 5620, which may be taken concurrently. Not open for credit to students who have passed MATH 3630.

Long-term insurance products, survival and longevity models, life tables, life insurance, life annuities, premium calculations, reserves.

#### **5631. Long-Term Actuarial Mathematics II**

Four credits. Prerequisite: MATH 5630. Not open to students who have passed MATH 3631.

A continuation of Long-Term Actuarial Mathematics I. Topics include multiple state models, multiple decrements, multiple lives, profit and loss analysis, pension plans and funding, retirement benefits, long-term health and disability.

#### **5637. Statistics for Actuarial Modeling**

Four credits. Not open to students who have passed MATH 3636 or 3637.

Data analysis for actuaries, linear models including generalized linear models, time series, principal component analysis, decision trees, cluster analysis, statistical computing with R, actuarial applications.

#### **5638. Predictive Analytics for Actuaries**

Three credits. Prerequisite: MATH 5637.

Models for predictive analytics, model building, selection, estimation, validation and diagnostics, and limitations; actuarial applications, and communication of results.

#### **5639. Actuarial Loss Models**

Three credits. Not open to students who have passed MATH 3639.

Loss distribution models for claim frequency and severity, aggregate risk models, coverage modifications, risk measures, construction and selection of parametric models, introduction to simulation.

#### **5640. Short-Term Insurance Ratemaking**

Three credits. Prerequisite: MATH 5639. Not open to students who have passed MATH 3640.

Credibility theory, pricing for short-term insurance coverages, reinsurance, experience rating, risk classification, introduction to Bayesian statistics.

#### **5641. Short-Term Insurance Reserving**

Three credits. Prerequisite: MATH 5639. Not open to students who have passed MATH 3641.

Techniques for estimating unpaid claims, use of claims triangles, underlying statistical theory behind the techniques, basic adjustments to data and estimation techniques to account for internal and external environments, estimating recoveries, model adequacy and reasonableness.

#### **5650. Financial Mathematics II**

(Formerly offered as MATH 5621.) Four credits. Not open for credit to students who have passed MATH 3650.

The continuation of MATH 5620, focusing on the mathematics of finance: measurement of financial risk and the opportunity cost of capital, the mathematics of capital budgeting and securities valuation, mathematical analysis of financial decisions and capital structure, and option pricing theory. Provides VEE credit in the Corporate Finance subject area for Society of Actuaries and Casualty Actuarial Society requirements.

#### **5660. Advanced Financial Mathematics**

Three credits.

An introduction to the standard models of modern financial mathematics including martingales, the binomial asset pricing model, Brownian motion, stochastic integrals, stochastic differential equations, continuous time financial models, completeness of the financial market, the Black-Scholes formula, the fundamental theorem of finance, American options, and term structure models.

#### **5661. Yield Curve Models**

Three credits.

The theory and practice of stochastic models to analyze and value interest rate derivatives, and practical issues in the markets where they are traded.

#### **5670. Financial Programming and Modeling**

Three credits.

Optimization; linear and non-linear programming; data mining and machine learning in a financial context.

#### **5671. Financial Data Mining and Big Data Analytics**

Three credits.

Data structures and algorithms; regression; classification; clustering; recommender systems; anomaly detection; Big Data tools; databases.

#### **5800. Investigation of Special Topics**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 36 credits.

Students who have well defined mathematical problems worthy of investigation and advanced reading should submit to the department a semester work plan.

#### **5850. Graduate Field Study Internship**

Variable (1-3) credits. Prerequisite: Instructor consent.

Participation in internship and paper describing experiences.

#### **6000. Seminar in Current Mathematical Literature**

Variable (1-6) credits. May be repeated for a total of 12 credits.

Participation and presentation of mathematical papers in joint student faculty seminars. Variable topics.

#### **6010. Seminar in Analysis**

Variable (1-6) credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

#### **6020. Seminar in Algebra**

Variable (1-6) credits. Prerequisite: MATH 5211. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

#### **6026. Seminar in Mathematical Logic**

Variable (1-6) credits. Prerequisite: MATH 5260. May be repeated for a maximum of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

#### **6027. Seminar in Set Theory**

Variable (1-6) credits. Prerequisite: MATH 5310. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

#### **6030. Seminar in Topology**

Variable (1-6) credits. Prerequisite: MATH 5321. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

#### **6036. Seminar in Geometry**

Variable (1-6) credits. Prerequisite: MATH 5360. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

#### **6040. Seminar in Applied Mathematics**

Variable (1-6) credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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## **Mechanical Engineering (ME)**

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#### **5105. Basic Concepts of Continuum Mechanics**

Three credits.

An introductory course in the theory of continuum mechanics. Development of physical principles using Cartesian tensors. Concepts of stress, strain and motion. Basic field equation for the Newtonian fluid and the elastic solid.

#### **5110. Advanced Thermodynamics**

Three credits.

Microscopic view of thermodynamics: probability and statistics of independent events, thermodynamic probabilities and most probable thermodynamic distributions, molecular structure

and partition function, Ensemble of microstates describing macroscopic behavior, with ideal gas as an example, Macroscopic descriptions of thermodynamic equilibrium and equilibrium states, Reversible processes, Heat and Work interactions, Mixtures of pure substances and chemical equilibrium, Stability and phase transitions, Irreversible thermodynamics, Onsager reciprocity relations and thermo-electric effects, Kinetic theory of gases.

#### 5120. Advanced Thermo-Fluids I

Three credits.

Fluid as a continuum, Kinematics and decomposition of fluid motion, Conservation of mass and momentum, Navier-Stokes equations, Conservation of energy, Exact solutions to governing equations, Potential flows, Vorticity dynamics and low Reynolds number flows, Laminar boundary layers including heat transfer, Laminar free shear flows including heat transfer, Flow instabilities and transition.

#### 5130. Advanced Heat and Mass Transfer

Three credits.

Review of thermophysical properties of matter including nanoscale effects. Exact and computational solutions of heat conduction equation. Dimensionless conduction rate approach for steady-state and transient conduction. Species diffusion equations with emphasis on stationary media and partitioning effects. Navier-Stokes equations and exact solutions for special cases. Correlation approach for treatment of single phase laminar, turbulent and two-phase flow. Radiative properties and treatment of surface radiation with spectral and directional effects. Emphasis on multimode heat transfer with applications in manufacturing, nanotechnology, information technology and biotechnology.

#### 5140. Heat and Mass Transfer in Multiphase Systems

Three credits.

Presentation of basic principles for analysis of transport phenomena in multi-phase systems and how they can be applied to a wide variety of applications. The scope is limited to thermodynamics and heat and mass transfer fundamentals in solid <-> liquid, liquid <-> vapor and solid <-> vapor with emphasis in condensation, evaporation, sublimation, vapor deposition, boiling, two phase flow, melting and solidification.

#### 5150. Analytical and Applied Kinematics

Three credits.

Analytical methods of coordinate transformation and two and three dimensional motion, analysis of relative motion and relative freedom through kinematics connections, study of finite and instantaneous properties of motion, study of the geometry of single and multi-parameter engineering curves, surfaces and motions. Application in the analysis and design of linkages and mechanisms.

#### 5155. Geometric Modeling

Three credits.

Mathematical modeling, computer representations and algorithms for manipulating geometry on a computer. Basic concepts of solid and geometric modeling from geometry and topology. Uses these concepts to develop computational techniques for creating, editing, rendering, analyzing and computing

with models of physical objects, mechanical parts, assembly and processes.

#### 5160. Theory and Design of Automatic Control Systems

Three credits.

Design features of a closed loop control system. Laplace domain analysis of electromechanical, pneumatic, hydraulic, thermal, and mechanical systems. Computer simulation of dynamic responses using software tools. Stability issues, Routh analysis, root locus, Bode and Nyquist analyses are addressed. An open-ended, hands-on design project from a current research topic is assigned.

#### 5180. Dynamics

Three credits.

Three-dimensional particle and rigid-body mechanics. Particle kinematics. Newton's laws, energy and momentum principles. Systems of particles. Rigid body kinematics, coordinate transformations. Rigid body dynamics, Euler's equations. Gyroscopic motion. Lagrange's equations.

#### 5190. Advanced Solid Mechanics

Three credits.

Fundamental idealizations used in linear solid mechanics and the fundamental principles of the subject. Idealizations covered include beams, circular torsion, struts and thick cylinders. Basic principles include principle of minimum potential energy, principle of minimum complementary energy, virtual work, equations of static equilibrium and direct and potential methods of solving equilibrium equations. Example applications vary but may include, bounding of elastic properties of composites, derivation of finite elements, solution of plate problems by Green's functions and others.

#### 5210. Intelligent Material Systems and Structures

Three credits.

Overview of piezoelectric materials and electrostrictive materials, shape memory alloys, magnetostrictive materials, and ER/MR fluids. Development of adaptive structure integrated with piezoelectric material, actuation and sensing, simultaneous optimal design/control of electromechanical integrated system, nonlinear and robust control. Design of shape memory alloy system for position control. Development of semi-active control using ER/MR fluids. Structural health monitoring and system identification research.

#### 5220. Principles of Machining and Machine Tools

Three credits.

Theories and applications of machining. Fundamentals of machine tools and machining automation. Physics and mechanics in machining, machining forces and stresses, shear angle theories. Basic phenomena pertinent to process characteristics, such as tribology and tool life, machinability, surface integrity, and economics. Mechanisms of machining and machine tool errors. Machining error compensation with feedback sensors. Machining chatter and vibration analyses. Case studies.

#### 5301. Macroscopic Equilibrium Thermodynamics I

Three credits.

Review of zeroth, first and second laws of thermodynamics, development of equilibrium thermodynamics from a postulatory viewpoint, examination of thermodynamic potentials and equilibrium states, stability of thermodynamic systems including implications on phase and chemical equilibrium. Thermodynamic availability analysis.

#### 5311. Computational Methods of Viscous Fluid Dynamics

Three credits. Prerequisite: Instructor consent.

An advanced course on integral and finite-difference methods of solution of the parabolic and elliptic equations of viscous fluid flow. Method of weighted residuals; Crank-Nicolson; Dufort-Frankel; Peaceman-Rachford alternating direction method; truncation error analysis; stability. Applications to boundary layer and heat transfer problems. A background of FORTRAN programming and numerical analysis is necessary.

#### 5320. Flow of Compressible Fluids I

Three credits.

Equations of motion of a compressible fluid. Quasi-one-dimensional flow including effects of friction, heat addition, and normal shocks. Two and three-dimensional flows. Velocity potential and stream function. Small perturbation theory. Subsonic pressure correction formulas. Kelvin and Crocco Theorems. Method of characteristics for steady and unsteady, rotational and irrotational flows. Curved and oblique shock waves. Shock tube theory.

#### 5340. Conduction Heat Transfer

Three credits.

Mathematical development of the fundamental equations of heat conduction in the steady and unsteady state, with or without internal heat generation or absorption. Study of exact and approximate methods used in the solution of heat conduction boundary value problems. Analytical, graphical, numerical and experimental evaluation of the temperature field in conducting media.

#### 5341. Radiation Heat Transfer

Three credits. Prerequisite: ME 5507.

Fundamentals of radiative emission (black body behavior and Planck's law), surface properties (emissivity, absorptivity, reflectivity, and transmissivity), electromagnetic theory for prediction of radiative properties, development of the methods of solution for radiant energy interchange between surfaces and in enclosures with and without absorbing, emitting, and scattering media present.

#### 5410. Theory of Elasticity

Three credits. Prerequisite: ME 5105.

The mathematical theory of linear elasticity. The theory of torsion of prismatic members. Two-dimensional elasticity problems. Thermal stress. Variational methods.

#### 5415. Advanced Dynamics

Three credits. Prerequisite: ME 5180.

Variational principles of mechanics: Lagrange's equations, Hamilton's principle. Hamilton-Jacobi theory, canonical transformations, integrability. Introduction to special relativity, applications

to orbital problems. Current topics in analytical dynamics.

#### 5420. Mechanical Vibrations I

Three credits.

Variational principles, Lagrange's equation. Equations of motion for multi-degree of freedom systems. Free vibration eigenvalue problem: modal analysis. Forced solutions: general solutions, resonance, effect of damping, and superposition. Vibrations of continuous systems: vibration frequencies and mode shapes for strings, bars, membranes, beams, and plates. Experimental methods and techniques.

#### 5422. Advanced Analysis of Composite Materials and Structures

Three credits.

Fundamental theories and computational skills to perform advanced analysis of composite materials and structures. The focus is on the damage and failure modeling of composites across multiple length scales. Various composite failure criteria and modeling techniques are reviewed, including the virtual crack closure technique, cohesive zone model and crack band model. Virtual simulations of composite manufacturing processes are introduced, with emphasis on the prediction of manufacturing-induced defects. Methods to evaluate the deformation response of 2D and 3D textile composites are also covered.

#### 5425. Principles of Machine Tool Design

Three credits.

The basic principles and philosophies in the design of precision machine tools. Mathematical theory and precision machine tools. Mathematical theory and physics of errors. The building up of error budget and the mapping of geometric and thermal errors. Design case study of a precision machine tool. Discussion of various types of sensors and actuators, bearings, and transmissions. System design considerations.

#### 5430. Mechanics of Composite Materials

Three credits. Prerequisite: ME 5410 or CE 5124.

Provides students with the fundamental knowledge to perform stress analysis of fiber-reinforced composite materials. Focus on the use of mechanics to study the stresses due to applied deformations, loads, and temperature changes. Begins with an introduction to composite materials, including their constituent properties, applications, advantages and limitations, and manufacturing techniques. Elasticity theory of anisotropic solids is also reviewed. Next, the determination of composite macroscopic constitutive relations through micromechanics is discussed, followed by the development of Classical Lamination Theory (CLT) for composite structural members, and applications to buckling and free vibration analyses. Concludes with a discussion on the use of CLT for failure analysis of composite structures subjected to mechanical and thermal loads.

#### 5431. Fatigue in Mechanical Design

Three credits. Not open for credit to students who have passed ME 3228.

Design calculation methods for the fatigue life of engineering components, fundamentals of fracture mechanics. Crack initiation and crack propagation fatigue lives. Neuber analysis, multiaxial stress, cyclic stress-strain behavior, mean and residual

stress effects. Selected current research topics, advanced research and design projects.

#### 5442. Composites Design

Three credits.

Fundamental principles and best practices for designing structural parts made from composite materials. Students will apply the knowledge and skills obtained throughout the course towards solving a practical design problem. Students will learn and use engineering software for predicting laminated composite properties, designing composite parts, and predicting the part performance under specified loads. At the end of the course, students will have created a complete definition of their design that may be manufactured and tested in subsequent courses.

#### 5433. Theory of Plasticity

Three credits. Prerequisite: ME 5410.

Introduces the physical basis for inelastic behavior and various mathematical descriptions for non-linear deformation. Provides an overview of plastic deformation in metals, including the role of dislocation behavior in strain hardening and strengthening. Detailed topics include yield surfaces, flow rules, hardening rules and introduction to viscoplastic modeling; emphasis is on finite element computer-based implementation of the concepts and their use in predicting the behavior of structures.

#### 5443. Composites Manufacturing

Three credits.

This course will provide an overview of multiple manufacturing methods for a select group of material types. Manufacturing methods will focus on production and process qualification for Aerospace Components. Students will have the opportunity to survey multiple materials, methods, and processes for part fabrication. Part evaluation methods will also be covered (destructive and non-destructive). There will be entry level exposure to manufacturing risk analysis through the use of industry standard tools (Manufacturing Flow, PFMEA, Control Plan, and PPAP).

#### 5507. Engineering Analysis I

Three credits.

Matrix algebra, indicial notation and coordinate transformations. Cartesian and general vectors and tensors, vector and tensor calculus. Partial differential equations: Fourier series, solution procedures to boundary value problems in various domains. Application to the mechanics of continuous media.

#### 5511. Principles of Optimum Design

Three credits.

Engineering modeling and optimization for graduate students in all areas of engineering. Problem formulation, mathematical modeling, constrained and unconstrained optimization, interior and boundary optima constraint interaction, feasibility and boundedness, model reduction, sensitivity analysis, linear programming, geometric programming, nonlinear programming, and numerical methods in optimization.

#### 5513. Modern Computational Mechanics

Three credits.

An advanced course in Computational Mechanics with emphasis on modeling problems using Finite Differences and Finite Element

techniques. Projects include initial value problems, ordinary differential equations and partial differential equations. Course evaluation is made by the successful completion of several assigned projects.

#### 5520. Finite Element Methods in Applied Mechanics I

(Also offered as CE 5164.) Three credits. Not open for credit to students who have passed CE 5162.

Formulation of finite elements methods for linear static analysis. Development of two and three dimensional continuum elements, axisymmetric elements, plate and shell elements, and heat transfer elements. Evaluation of basic modeling principles including convergence and element distortion. Applications using commercial finite element programs.

#### 5521. Finite Element Methods in Applied Mechanics II

(Also offered as CE 5166.) Three credits.

Formulation of finite elements methods for modal and transient analysis. Development of implicit and explicit transient algorithms. Stability and accuracy analysis. Formulation of finite element methods for material and geometric nonlinearities. Development of nonlinear solution algorithms. Applications using commercial finite element code.

#### 5895. Special Topics in Mechanical Engineering

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Classroom and/or laboratory courses in special topics as announced in advance for each semester. The field of study or investigation is to be approved by the Head of the Department before announcement of the course.

#### 6110. Statistical Thermodynamics

Three credits.

A microscopic development of thermodynamics including statistical ensembles, quantum statistical mechanics, and a comparison of various molecular models.

#### 6130. Advanced Thermo-Fluids II

Three credits.

Review of governing flow equations, instability and transition, Reynolds averaging and closure approximations, Algebraic turbulence models, Two-equation turbulence models, Large eddy simulations, Turbulence statistics: probability density function and power spectral densities, Energy cascade and intermittency, Turbulent boundary layers including heat transfer, Turbulent free shear flows, Turbulent internal flows (pipes and channels) including heat transfer, Natural convection.

#### 6140. Convection Heat Transfer

Three credits.

A study of heat transfer to laminar and turbulent boundary layers for both compressible and incompressible fluids. Free convection heat transfer is also investigated.

#### 6160. Turbines and Centrifugal Machinery

Three credits. Prerequisite: ME 5320.

Theory, design and performance of centrifugal and axial flow machinery including turbines, blowers, fans, compressors, superchargers, pumps, fluid couplings and torque converters. A detailed

study of the mechanics of the transfer of energy between a fluid and a rotor.

### **6170. Combustion and Air Pollution Engineering**

Three credits.

Review of thermodynamics and chemical equilibrium. Introduction to chemical kinetics. Studies of combustion processes, including diffusion and premixed flames. Combustion of gases, liquid, and solid phases, with emphasis on pollution minimization from stationary and mobile systems. Air pollution measurement and instrumentation.

### **6173. Advanced Combustion**

Three credits. Prerequisite: ME 6170, or ME 2234 and 3250.

Review of thermodynamic properties, transport properties, conservation equations of multicomponent reacting gas. Introduction to chemical kinetics. Classification of combustion waves. Deflagrations, detonations and diffusion flames. Ignition phenomena, droplet and spray combustion and some aspects of turbulent combustion.

### **6176. Hypersonic Aerodynamics**

Three credits. Prerequisite: ME 5320.

Hypersonic small disturbance theory; similarity laws. Newtonian, shock-expansion and blast-wave theories of hypersonic flow. Aerodynamic shapes for minimum hypersonic drag. Physical properties of real gases; shock waves in real gas flow.

### **6177. Aerothermal Analysis**

Three credits. Prerequisite: ME 5320; instructor consent required.

High-speed, viscous compressible flow. Equations of motion. Thermodynamic and transport properties of high temperature gases. Blunt body heating. Boundary layer equations and transformations. Hypersonic boundary layers with heat and mass transfer. Reference enthalpy methods.

### **6222. Non-Linear Vibrations**

Three credits.

Vibrations of non-linear single-degree-of-freedom systems. Singular points. Liapunoff function. Approximation techniques. Stability. Self-excited vibrations. Vibrations of non-linear multi-degree-of-freedom systems.

### **6260. Advances in Control Systems Design**

Three credits. Prerequisite: ME 5160 or 5507.

Review of the state space design concepts for control systems. Mathematical modeling of dynamic systems. Lagrange's and Newton's representations. Decentralized or linearized control. Variable structure systems. Sliding mode control of nonlinear systems and discussions of constraint control cases. Time-delayed systems. Stability-based analysis and synthesis. Engineering applications. Open-ended control system design projects.

### **6300. Independent Study in Mechanical Engineering**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Individual exploration of special topics as arranged by student and instructor.

### **6301. Macroscopic Equilibrium Thermodynamics II**

Three credits. Prerequisite: ME 5301.

Review of zeroth, first and second laws of thermodynamics, development of equilibrium thermodynamics from a postulatory viewpoint, examination of thermodynamic potentials and equilibrium states, stability of thermodynamic systems including implications on phase and chemical equilibrium. Thermodynamic availability analysis.

### **6330. Advanced Measurement Techniques**

Variable (1-3) credits. Prerequisite: Instructor consent.

A critical examination of measurement techniques. Principles of operation of various instruments. Estimates of accuracy, precision, and resolution of measurements. Intended primarily for students contemplating experimental theses. When possible, specific topics covered will be structured to the needs of the class.

### **6340. Graduate Seminar**

Zero credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Presentations by invited guest speakers on topics of current interest in various Mechanical Engineering and allied fields.

### **6511. Advanced Optimum Design**

Three credits. Prerequisite: MATH 3410 or ME 5511.

Advanced techniques in engineering design and process modeling optimization for graduate students in all areas of engineering. Review of theories of multi-variable constrained and unconstrained optimization, and computational techniques in nonlinear programming, structured programming, including integer programming, quadratic programming, genetic algorithms, theories of multivariable optimization from calculus of variations, computational techniques in functional optimization.

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## **Medical Science (MEDS)**

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### **5308. The Nature of Evidence in Scientific Research**

Two credits.

Aspects of the scientific process that are common to all levels of biomedical investigations: from biophysics in cell-free systems to molecular biology in cells, to physiology in whole organisms, to epidemiology and clinical investigation in humans. These features begin with enunciation of the question to be asked, and include (1) Identification of a system to address the question, (2) Specification of the systems and their manipulation, (3) Assessment of outcomes, and (4) Drawing inferences on the basis of results. Discussion of seminal, published works on the topics. Two to three key papers will be distributed to participants at least one week before the scheduled discussions. There will be no examination for the course. Students are expected to actively participate in critical evaluation and discussion during each of the weekly two-hour sessions. Evaluation of performances will be based solely on such participation.

### **5309. Molecular Basis of Disease**

Two credits.

Seminar and discussion based course that reviews the molecular understanding of human disease.

### **5310. Responsible Conduct in Research**

One credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Introduction to ethical and legal issues associated with the practice and reporting of science. Uses a case study approach and requires in-class student participation.

### **5313. Biomaterials and Tissue Engineering**

(Also offered as BME 5700 and MSE 5700.) Three credits. Prerequisite: Instructor consent.

A broad introduction to the field of biomaterials and tissue engineering. Presents basic principles of biological, medical, and material science as applied to implantable medical devices, drug delivery systems and artificial organs.

### **5322. Developmental Biology**

Two credits.

History, concepts, and experimental strategies in both classical and modern developmental biology. Topics ranging from early fertilization, to early embryonic development, to the formation of adult structures are considered and compared in a range of model organisms. One hour of lecture by instructors and one hour of literature analysis and discussion by students each week. Course grade will combine results of class participation and a final exam.

### **5323. Genetics and Developmental Biology Journal Club**

One credit. May be repeated for a total of 10 credits.

Reading and discussion of current research in the fields of genetics and developmental biology with emphasis on molecular aspects. Periodic presentation of research papers and active discussion will be expected of all participants.

### **5325. Computational Genomics Practicum**

Two credits. Prerequisite: Instructor consent.

A practical introduction to computational genomics focusing on methods for processing/analyzing Next Generation Sequencing (NGS) data. 1. Programming: Introduction to the Linux command line, elements of Python and R programming. 2. Genomics software tools for performing sequence read-alignments, transcript-expression profiling, and robust procedures for gauging differential gene expression. 3. Methods for genome assembly, genome variation detection, motif finding, and data-visualization. 4. Statistical topics include probability distributions, central limit theorem, hypothesis testing, linear models, and dimensionality reduction.

### **5327. The Logic of Modern Biology**

Four credits.

Fundamental biochemical and genetic principles that underlie all areas of modern biology. The biochemistry and genetics of both prokaryotes and eukaryotes are addressed. Reading and discussion of papers in the literature are important elements of the course.

### **5329. Immunobiology I**

Two credits.

An overview of basic concepts in immunology including antibody structure, function and production, molecular genetics of the immune system and cellular regulation of immunity.

### 5330. Immunobiology II

Two credits. Prerequisite or corequisite: MEDS 5329.

This continuation of MEDS 5329 considers effect or mechanisms of the immune system in inflammation, hypersensitivity, transplantation and autoimmunity as well as regulation of the immune system by cells, cellular products and chemical or physical agents.

### 5335. Advanced Molecular and Cellular Immunology I

Four credits. Prerequisite: Instructor consent.

Major areas covered include: (1) Development of the immune system with respect to lymphoid organs and lymphocyte subsets; (2) Mechanisms of antigen processing and presentation; (3) Lymphocyte activation including the role of costimulatory molecules and (4) Regulation of the immune response including tolerance induction, cytokine interactions and signal transduction.

### 5341. Molecular Neurobiology of Excitable Membranes

Three credits. Prerequisite: Instructor consent.

Emphasizes the relation between structure and function of biological interfaces that comprise electrically excitable and chemically excitable (synaptic) membranes. Models of electrically and chemically induced regulation of ion movement via channels and transporters are examined. Genetic manipulation of channel composition is evaluated with attention to altered function and inferences about their structure.

### 5351. Biochemistry II

Three credits.

Fundamentals of biomolecular interactions and protein structure. Structure/function of select proteins and enzymes essential to the following: metabolic pathways, DNA/RNA transactions, gene expression, cell cycle and signal transduction, and the cytoskeleton.

### 5369. Advanced Genetics and Molecular Biology

Three credits.

An advanced course emphasizing approaches to the genetic analysis of eukaryotic systems including yeast, fungi, *Drosophila*, mice, and humans. Topics include genome organization, DNA replication, regulation of gene expression, development, and differentiation.

### 5371. Systems Neuroscience

Three credits. Prerequisite: Instructor consent.

Part of the core series in the Neuroscience graduate program. Functional organization of neural systems underlying sensation, movement, language, learning/plasticity, and emotion/arousal. Sensory systems will include the somatosensory, auditory, visual, vestibular, and chemosensory systems. Motor systems will include the spinal cord, brain stem, cerebellum, vestibular system, oculometer system, basal ganglia and cerebral cortex.

### 5372. Neuroscience: Cellular and Molecular Neuroscience

Three credits. Prerequisite: Instructor consent.

Part of a core series in the Neuroscience Program, this course provides an introduction to basic concepts in the study of cell biology, neuroanatomy, neurophysiology, neurochemistry, and molecular biology of the nervous system.

### 5375. Neuroscience: Current Research Topics/Methods

One credit. Prerequisite: Instructor consent. May be repeated for a total of four credits.

Familiarizes students early in their education (first or second year) with various key methodologies to which they will be exposed in courses, journal club presentations, and seminars. After a brief overview of basic concepts, applications, controls, and permutations of the method in the classroom, students will observe and participate in a demonstration of important technical aspects of the method in the laboratory setting. Targeted toward students with an interest in neuroscience or neuroimmunology.

### 5377. Neurobiology of Hearing

Three credits. Prerequisite: Instructor consent.

Provides in-depth analysis (using the Auditory System as a model system) with application of interdisciplinary approaches of cell and molecular biology, developmental neurobiology, neuroanatomy, neurophysiology/biophysics, neurochemistry, neural modeling, psychophysics, and plasticity, with state-of-the-art methods used in neuroscience research today. The team of faculty members contribute a variety of complementary fields of study.

### 5378. Computational Neuroscience

Three credits. Prerequisite: Instructor consent.

Students study the function of single neurons and neural systems by the use of simulations on a computer. Combines lectures and classroom discussions with conducting computer simulations. The simulations will include exercises and a term project. Each student will complete a term project of neural simulation to be developed during the second half of the semester. The topic of the term project should be approved by the instructors by the middle of the semester. The grade will be based on the exercises and the term project. Course includes: analysis of electrical circuits modeling neuronal cell membrane and the related differential equations; the Hodgkin-Huxley model of voltage- and time-dependent sodium and potassium conductances in the squid axon; voltage-clamp and current-clamp; the relationship between two rate constants versus the steady-state value and time constant underlying each conductance; neuronal response properties that are related to voltage-dependent and calcium-dependent ion channels; single- and multi-compartment models with ionic conductances simulating specific neuronal response properties described in the literature; excitatory and inhibitory postsynaptic currents and underlying ligand-gated ion channels; dendritic electrotonus and synaptic integration; temporal and spatial interactions of synaptic inputs to the dendritic tree and the cell body; action potential propagation in axons; neural circuits.

### 5380. Cell Biology

Four credits.

Basic eukaryotic cell biology. Major topics include Methods in Cell Biology; Cell Growth and Proliferation; Cytoskeleton; Transport: Hormone

Response; Cytoplasmic Organelles and Membrane Structure, Function, Biogenesis, Transport and Sorting; Cell Motility; Chromatin Structure and Organization; and Extracellular Matrix and Cell Adhesion.

### 5382. Practical Microscopy and Modeling for Cell Biologists

Two credits.

Introduction to the students the most recent achievements in the field of intracellular signaling and regulation. Each of the participating faculty members will give an introductory lecture to provide an overview of signaling events in their field of expertise and discuss the most important recent papers.

### 5383. Neurobiology of Disease

Three credits.

Discussion and lecture run by clinician and basic scientist, on diseases of the nervous system.

### 5384. Brain Microcircuits

Two credits. Prerequisite: Instructor consent.

Brain microcircuitry is an upper level course.

### 5385. Molecular Mechanisms of Neurobiological Disorders

Three credits.

Discussion of current papers relevant to molecular analyses of neurobiological diseases.

### 5395. Independent Study

Variable (1-6) credits.

### 5415. Craniofacial and Oral Biology

Two credits. May be repeated for a total of four credits.

Combination lecture and literature discussion course with a focus on the on the underlying biochemical, molecular and genetic mechanisms involved in the pathogenesis of craniofacial and oral disorders, the identification of unsolved questions, and consideration of possible approaches to investigate these questions.

### 5418. Stem Cells and Regenerative Biology

Three credits. Prerequisite: MEDS 5322 or 5327 or 5380.

A literature-based course on the fundamental aspects of stem cells; their nature, origin, self-renewal and differentiation during embryogenesis and tissue regeneration. Taught by a team of experts. Grade based on mid-term tests, class participation and presentation.

### 6372. The Neurobiology of Glia

Two credits.

Detailed introduction and advanced, in-depth discussion on specific topics related to the cellular biology and pathobiology of glia. First part of the course will be didactic lectures covering each of the types of glia in the central and peripheral nervous systems. Second part of the course will provide focused paper discussions on the specific roles of glia in particular diseases of the nervous system that may change with time to stay current with recent publications and innovations in the field.

### 6404. Correlated Medical Problem Solving - Part A

Two credits. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

This course serves to expand upon and integrate basic science concepts introduced in the Human Systems.

**6405. Correlated Medical Problem Solving - Part B**

Two credits. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Expands upon and integrates basic science concepts introduced in the Human Systems course.

**6406. Human Development and Health**

Variable (1-2) credits. May be repeated for a total of two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The HDH course has been taken by combined MD/PhD students for graduate school credit in the 2nd year of study. The School of Medicine has now divided the course so that parts are taken in the 1st and 2nd years. In fall 2013, current second year students will enroll for two credits while current first year students and all subsequent classes will enroll for 1 credit in each of the first two years.

**6407. Mechanisms of Disease: Part A**

Four credits. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

A 30-week, yearlong medical school course covering the pathology and pathophysiology of organ systems and basic principles of therapeutics. The instruction format includes about 50% lecture, 15% laboratory, 30% small group conference and 5% clinical-pathological correlations. The course covers General Pathology, Pharmacological Principles, and Infectious Disease; Diseases of Homeostasis; Oncology and Diseases of Metabolism; and Diseases of the Nervous System, Diseases of the Reproductive System and Immune and Non-immune Mediated Diseases.

**6408. Mechanisms of Disease: Part B**

Six credits. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

A 30-week, yearlong medical school course covering the pathology and pathophysiology of organ systems and basic principles of therapeutics. The instruction format includes about 50% lecture, 15% laboratory, 30% small group conference and 5% clinical-pathological correlations. The course covers General Pathology, Pharmacological Principles, and Infectious Disease; Diseases of Homeostasis; Oncology and Diseases of Metabolism; and Diseases of the Nervous System, Diseases of the Reproductive System and Immune and Non-immune Mediated Diseases.

**6411. Clinical Practicum**

12 credits. Prerequisite: Instructor consent. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Clinical experience in the major disciplines including: Medicine, Surgery, Obstetrics and Gynecology, Psychiatry, Family Medicine, and Pediatrics.

**6412. Advanced Clinical Practicum**

11 credits. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Advanced clinical work with opportunities in the major clinical disciplines.

**6413. Cancer Biology**

Two credits.

This is a survey course to explore the genetics and pathobiology of cancer by focusing on a variety of current research topics. Understanding the disease process requires studying normal mechanisms of growth control. Emphasis will be on topics such as differentiation, apoptosis, growth factors, oncogenes, tumor suppressor genes, viruses and signal transduction.

**6414. Advanced Correlated Medical Problem Solving - Part A**

Two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Expands upon and integrates basic science concepts introduced in Human Development and Health and Mechanisms of Disease.

**6417. Advanced Correlated Medical Problem Solving - Part B**

Two credits. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Expands upon and integrates basic science concepts introduced in Human Development and Health and Mechanisms of Disease.

**6444. Medical Microbiology**

Four credits.

Provides first and second year graduate students with a broad understanding of the molecular and medical aspects viruses and bacteria. For viruses, topics include entry, genome replication and gene expression, assembly, viral transformation, pathogenesis, host immune responses, clinical presentations viral immunology, treatment principles including vaccines and antiviral therapeutics, and emerging and re-emerging viruses that threaten human health. For bacteria, topics include development and differentiation, bacterial genetics and genomics, bacterial cell cycle (DNA replication, chromosome segregation and cell division), cell-cell communication, pathogenesis, host immune responses, clinical presentations and treatment principles. The course will include lecture, discussion of primary literature and student presentations. Grading will be based on class participation, student presentation and a short paper.

**6445. Skeletal Biology**

Two credits. Prerequisite: Instructor consent.

A comprehensive survey of the cellular and molecular mechanisms that regulate the development, growth, differentiation, remodeling, and repair of the skeletal system.

**6447. Tool Kit for Scientific Communication**

One credit. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Through a series of lectures and workshops, designed to improve the ability of students to present scientific data in written and oral format. These skills are essential, not only as a graduate student, but in future careers as scientist. The curriculum covers basic elements and logical order of presentations. Reviewer's perspectives, grant writing resources, workshops, and evaluation

of recent seminars help students to design and evaluate research projects.

**6448. Foundations of Biomedical Science I**

Four credits.

Encompasses topics considered fundamental to any student pursuing a Ph.D. in any Area of Concentration in the Biomedical Science Graduate Program. Combines an introduction to fundamental concepts along with a more in-depth analysis of the research that underlies some of these ideas. A variety of topics will be examined in approximately one-week modules that will include a basic, introductory one hour lecture on Mondays, a more in-depth discussion of one to two critical historical papers on an aspect of the topic on Wednesdays and then a small group discussion on a more modern paper related to the area on Fridays. Periodically, the course will include Consolidation weeks that discuss key methodologies in the context of new concepts or concepts previously discussed.

**6449. Foundations of Biomedical Science II**

Four credits.

Encompasses topics considered fundamental to any student pursuing a Ph.D. in any Area of Concentration in the Biomedical Science Graduate Program. Combines an introduction to fundamental concepts along with a more in-depth analysis of the research that underlies some of these ideas. A variety of topics will be examined in approximately one-week modules that will include a basic, introductory one hour lecture on Mondays, a more in-depth discussion of one to two critical historical papers on an aspect of the topic on Wednesdays and then a small group discussion on a more modern paper related to the area on Fridays. Periodically, the course will include Consolidation weeks that discuss key methodologies in the context of new concepts or concepts previously discussed.

**6450. Optical Microscopy and Bio-imaging**

(Also offered as BME 6450.) Three credits.

Presents the current state of the art of optical imaging techniques and their applications in biomedical research. Covers both traditional microscopies (DIC, fluorescence etc.) that have been an integrated part of biologists' toolbox, as well as more advance topics, such as single-molecule imaging and laser tweezers. Four lab sessions are incorporated in the classes to help students to gain some hand-on experiences. Strong emphasis on current research and experimental design.

**6455. Introduction to Systems Biology**

Three credits.

Guides students into a biology world as seen by engineers, physicists, mathematicians and computer scientists. Discussion of different kinds of predictive mathematical models and their dynamical behavior; stability, switching and stochasticity of a biological system; resources needed to start building a model; models exchange, simulation and visualization; public databases and software tools available for a modeler. Provides the necessary background to read modeling papers, choose Systems Biology resources that will help in biological projects, and be able to select a modeling technique appropriate for a given biological project.

**6456. Human Systems A**

Six credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

A 38-week long medical school course taken in the first year of the combined MD/PhD program. The course is divided into four sections: Human Biology, Organ Systems 1, Organ Systems 2 and Organ Systems 3. The course covers the basic elements of human anatomy, histology, biochemistry, physiology and genetics and an introduction to biostatistics and the principles of epidemiology. The instructional format includes about 50% didactic lectures, 30% laboratory and 20% small group sessions.

**6457. Human Systems B**

Six credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

A 38-week long medical school course taken in the first year of the combined MD/PhD program. The course is divided into four sections: Human Biology, Organ Systems 1, Organ Systems 2 and Organ Systems 3. The course covers the basic elements of human anatomy, histology, biochemistry, physiology and genetics and an introduction to biostatistics and the principles of epidemiology. The instructional format includes about 50% didactic lectures, 30% laboratory and 20% small group sessions.

**6461. Clinical Radiation Sciences: Physics and Biology (Part A)**

Two credits. Prerequisite: Instructor consent.

A continuous pair (i.e., MEDS 6461 and 6462) of semester lecture/seminar courses which examines the physical and biological principles underlying the uses of radiation and allied radiation sciences in clinical diagnosis and therapy. Characteristics of imaging systems, Nuclear Medicine, Radiation Therapy, biological effects of ionizing radiation, radiation measurement and dosimetry, and quality assurance will be covered through critical readings in texts and the literature. Available to individuals enrolled in residency programs of medical radiology, oral and maxillofacial radiology, and other specialties engaged in patient imaging. Some of these students will be enrolled in a concurrent degree program, either Master of Dental Science or PhD in Biomedical Sciences. Also available to individuals in Master's or PhD level graduate studies who desire an in-depth study of radiation sciences, and how they apply to patient care.

**6462. Clinical Radiation Sciences: Physics and Biology (Part B)**

Two credits. Prerequisite: Instructor consent.

A continuous pair (i.e., MEDS 6461 and 6462) of semester lecture/seminar courses which examines the physical and biological principles underlying the uses of radiation and allied radiation sciences in clinical diagnosis and therapy. Characteristics of imaging systems, Nuclear Medicine, Radiation Therapy, biological effects of ionizing radiation, radiation measurement and dosimetry, and quality assurance will be covered through critical readings in texts and the literature. Available to individuals enrolled in residency programs of medical radiology, oral and maxillofacial radiology, and other specialties engaged in patient imaging. Some of these students will be enrolled in a concurrent degree program, either Master of Dental Science

or PhD in Biomedical Sciences. Also available to individuals in Master's or PhD level graduate studies who desire an in-depth study of radiation sciences, and how they apply to patient care.

**6479. Chemistry and Biology of Drugs of Abuse**

Five credits.

An in-depth interdisciplinary approach to the neurobiology of drug abuse, integrating basic and clinical sciences. Lectures, student presentations of original research reports, and laboratory exercises dealing with methods to measure neurotransmitter transport, ligand binding to receptors and transmitter action on ligand-activated channels.

**6495. Independent Study**

Variable (1-6) credits. May be repeated for credit.

A reading course for those wishing to pursue special topics in the biomedical sciences under faculty supervision.

**6496. Laboratory Rotation**

Variable (1-6) credits. May be repeated for credit.

**6497. Graduate Seminar**

Variable (1-6) credits. May be repeated for credit.

Reading and discussion of recent research developments in various areas of biomedical science.

**6498. Special Topics in Biomedical Science**

Variable (1-4) credits. May be repeated for credit.

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## Molecular and Cell Biology (MCB)

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**5001. Biochemistry**

Five credits.

Metabolism of carbohydrates, lipids, amino acids, proteins, and nucleic acids, including regulation, and to the structure and function of biological macromolecules. Provides suitable preparation for advanced course work in biochemistry, biophysics, and other areas of molecular biology. Graduate students with considerable laboratory experience may arrange to take only the lecture portion of this course as Biology: MCB 5896 with consent of instructor.

**5002. Biochemistry Laboratory**

Three credits. Prerequisite: Instructor consent.

Theory and application of modern techniques for the separation and characterization of biological macromolecules, including several types of liquid chromatography, liquid scintillation spectrophotometry and SDS polyacrylamide gel electrophoresis. Each student will carry out individual projects using selected techniques.

**5003. Biophysical Chemistry I**

Three credits.

Thermodynamics, electrostatics of polar molecules and ionic solutions, dielectric constants, conductance, acid-base equilibria, molecular interactions.

**5008. Techniques of Biophysical Chemistry**

Three credits.

Theory and applications of biophysical methods for the analysis of the size, shape and interactions of proteins and nucleic acids. Topics include analytical ultracentrifugation, light scattering, X-ray scattering, calorimetry, surface plasmon resonance and single molecule approaches.

**5010. Biological Optical Spectroscopy: Practical Applications**

Two credits. If student has taken MCB 5038, this course may only be taken if the content is different.

Practical applications of spectroscopy in biochemistry and the biological sciences. Topics include fluorescence, circular dichroism and various spectroscopic techniques with particular emphasis on biological macromolecules. Analysis of raw data and interpretation of published results will be used to define the suitability and limits of these techniques.

**5012. Foundations of Structural Biochemistry**

Three credits.

Comprehensive introduction to the molecular aspects and dynamics of structural biochemistry. Examination of nucleic acid, protein, and lipid structures including current topics in conformation and folding, enzyme kinetics, nucleic acid stability, ligand/receptor binding, and bioenergetics. Overviews of experimental strategies used to study macromolecular structure and interactions.

**5013. Structure and Function of Biological Macromolecules**

Three credits.

Fundamentals of protein structure, and the forces that stabilize structure. Recurrent structural motifs, molecular ancestry/homology, and insights into proteins structure evolution. Protein folding and dynamics. Structure-function correlations, and structural basis of regulation. Techniques used to investigate structure: X-ray diffraction, NMR, TEM, AFM, structure prediction, computational simulations. Advanced topics: chaperones; structural genomics; role of misfolded proteins in disease.

**5014. Structure and Dynamics of Macromolecular Machines**

Three credits. Prerequisite: Open only to Molecular and Cell Biology graduate students, others with consent. Recommended preparation: a course in biochemistry or structural biology.

Biochemical and biophysical characteristics of macromolecular assemblies starting at the atomic level and proceeding to the cellular level. Topics include ribosomes, viruses, polymerases, membrane protein assemblies and ion transporters, which will be examined through lecture, discussion, and interactive computational modules.

**5015. X-ray Structure Analysis**

Three credits. Prerequisite: Instructor consent.

The determination of three-dimensional atomic-level structure by diffraction methods. Small-angle solution scattering. Protein crystallography.

**5025. Structure and Function of Biological Membranes**

Three credits.

Overview of cell membrane structure and function based on a foundation of physical and biochemistry principles. Topics include lipid bilayers, vesicles and liposomes, cholesterol, membrane protein structure and function, transport, membrane fusion, receptors, drug/membrane interactions and membranes in cell regulation.

**5034. Human Metabolism and Disease**

Two credits.

A thorough analysis of the inter-relationships of metabolic pathways in connection with human

health and disease, including inherited metabolic diseases and the role of hormones in metabolic pathways.

#### **5038. Techniques in Structural Biology**

(Also offered as MEDS 5338.) Two credits. Prerequisite: Instructor consent. May be repeated for a total of eight credits.

A short course to introduce graduate students and selected undergraduates to modern techniques in structural biology. Each course offering covers a specific technique: NMR, computational and graphical analysis of biomolecules, X-ray crystallography, analytical ultracentrifugation, spectroscopy, calorimetry, and others.

#### **5076. Biomolecular Nuclear Magnetic Resonance Spectroscopy**

Two credits. Recommended preparation: courses in biochemistry, organic chemistry, and physical chemistry.

Open to undergraduate students with consent of instructor. Advanced treatment of NMR spectroscopy as applied to problems in structural biology, particularly protein structure and dynamics.

#### **5080. Frontiers in Microbiology**

One credit. Prerequisite: Instructor consent. May be repeated for a total of five credits.

Current topics in microbiology including research advances, impact of microorganisms on the environment and society, their role in health and disease, and applications of microbiological research in academic, government and industrial settings.

#### **5099. Graduate Seminar in Biochemistry**

One credit. May be repeated for a total of two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

#### **5200. Cell Biology of the Mammalian Secretory Apparatus**

Three credits. Prerequisite: Instructor consent.

Critical reading of the primary literature focusing on how eukaryotic cells synthesize and traffic secretory and membrane proteins. Emphasis on effectiveness of data presentation in papers.

#### **5210. Molecular Endocrinology**

(Also offered as PNB 5270.) Three credits.

Molecular mechanism(s) of hormone action in vertebrates and invertebrates. Molecular and genetic characterization of hormones, receptors, and signal transduction, and hormone actions at the molecular, cellular, and organismal levels. Includes student presentations on selected papers.

#### **5217. Biosynthesis of Nucleic Acids and Proteins**

Three credits.

Mechanisms of protein and RNA synthesis in prokaryotes and eukaryotes. Topics such as RNA processing, gene splicing, and control of protein and RNA synthesis are discussed.

#### **5219. Developmental and Regenerative Biology**

Three credits. Prerequisite: Instructor consent. Not open for credit to students who have passed MCB 3219 or 4219.

Principles of animal embryonic development and regeneration with emphasis on the cellular and molecular basis of pattern formation and cell

differentiation in a variety of model organisms. Relevance to human development, disease and therapeutic applications will be emphasized.

#### **5240. Virology**

Three credits.

Biological, biochemical, genetic, and physical characteristics of viruses, with an emphasis on molecular and quantitative aspects of virus-cell interactions.

#### **5243. Molecular Analysis of Development**

Three credits.

An analysis of the mechanisms of morphogenesis and differentiation with special emphasis on molecular aspects.

#### **5250. Techniques in Cellular Analysis**

Three credits. Prerequisite: Open only to Molecular and Cell Biology graduate students. Recommended preparation: a course in cell biology.

Examination of methodologies used to address cell biological questions: how they work, how they synergize, their advantages and disadvantages. Topics include detection and measurement of protein activities and interactions, molecular genetic manipulation of gene expression and protein function, determination of cellular localization and in vivo functional assays.

#### **5255. Cellular and Molecular Immunology**

Two credits. Prerequisite: Instructor consent. May be repeated for a total of eight credits.

Genetic, biochemical, and cellular control of the immune system, addressing such topics as antigen recognition, immune regulation, stress and immunity, apoptosis, and signal transduction.

#### **5280. Advanced Cell Biology**

Three credits.

Integrative approach to the study of eukaryotic cell biology emphasizing structure, function, and dynamics of the cytoskeleton, membrane, and extracellular matrix.

#### **5299. Current Topics in Cell Biology**

Variable (1-2) credits. Prerequisite: Instructor consent. May be repeated for a total of eight credits.

Discussion of papers from recent literature. Topics include cytoskeletal function, cell motility, gene expression, and signal transduction, with special focus on their relationship to development, the immune system, and cancer.

#### **5426. Genetic Engineering and Functional Genomics**

Three credits.

Methods and applications of genetic engineering, including gene manipulation and transfer techniques in prokaryotes and eukaryotes. Emphasis on the application of recombinant DNA technology in the elucidation of gene function. Recent technological developments in molecular genetics and the societal issues related to these developments will also be addressed. Students will prepare a grant application or other written assignment.

#### **5427. Laboratory Techniques in Functional Genomics**

One credit. Prerequisite: Instructor consent. May be repeated for a total of seven credits.

Molecular biological techniques utilized in gene discovery and in the functional characterization of genes in animal development. Taught as a series of

short modules, each focusing on a different set of techniques. With a change of content, this course may be repeated for credit.

#### **5428. Theory and Practice of Forensic Identification Methods**

One credit. Prerequisite: Instructor consent. May be repeated for a total of eight credits.

Advanced consideration of the theory, practice, and analysis of various techniques used in forensic identification strategies. Taught as a series of stand-alone, "executive format" modules with each focused on a different methodology and consisting of hands-on laboratory combined with lectures and data analysis, problem solving, and/or case studies. With change of content, may be repeated for credit.

#### **5429. Theory and Practice of High Throughput Sequence Analysis**

Two credits. Prerequisite: Instructor consent. May be repeated for a total of 16 credits.

Advanced training in experimental design, sample preparation, quality control, high throughput sequence acquisition and analysis of data sets for a variety of genomics applications. Taught as a series of modules with each focused on a different aspect of the practice of next-generation genome analysis.

#### **5430. Analysis of Eukaryotic Functional Genomic Data**

Three credits. Prerequisite: Instructor consent.

Construction and implementation of computational pipelines that integrate available bioinformatics tools to perform processing, analysis and quality control of eukaryotic functional genomics datasets from CHIP-seq, RNA-seq and other high throughput sequencing approaches. No programming experience required.

#### **5432. Molecular and Genetic Approaches to Developing Systems**

Two credits.

Topics of current interest in developmental biology are presented with related developmental and genetic background information.

#### **5445. Genome Dynamics and Epigenetics**

Three credits.

An examination of the mechanisms of eukaryotic genome function and dynamics. Topics include, but are not limited to, chromatin organization, chromosome structure and function, and nuclear architecture.

#### **5452. Problems in Genetics of Eukaryotes**

Three credits.

Consideration of such problems as chromosomal organization, mechanisms of meiotic drive, epigenetic inheritance, chromosome distribution, and transposable elements in model genetic organisms.

#### **5454. Molecular Aspects of Genetics**

Two credits. May be repeated for a total of eight credits.

Integration of the biological effects, molecular structure, expression, and evolution of genes and genomes.

#### **5471. Current Topics in Molecular Evolution and Systematics**

One credit. May be repeated for a total of four credits.

Current concepts, ideas and techniques in the field of molecular evolution, and theoretical problems peculiar to the phylogenetic analysis of molecular data.

#### **5472. Computer Methods in Molecular Evolution**

Three credits.

Practical aspects of molecular data analyses. Databank searches, sequence alignments, statistical analyses of sequence data. Parsimony, distance matrix, and spectral analysis methods. Students compile and analyze a data set of their choice.

#### **5480. Frontiers in Applied Genomics**

One credit. Prerequisite: Instructor consent. May be repeated for a total of four credits.

Current topics in genomics research including ethics, impacts on society, and applications in academic and industrial settings.

#### **5490. Industrial Insights**

Variable (1-2) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Research and development, regulation, intellectual property protection, and production of commercial services and products from the vantage point of the genomics, biotechnology, and pharmaceutical industries. May be repeated with a change in topic.

#### **5491. Professional Development Seminar**

One credit. Prerequisite: Open only to Molecular and Cell Biology M.S. students. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Speakers from industry, government agencies, universities and non-profits provide advice about career paths, business models, hiring and employment opportunities.

#### **5499. Current Topics in Genetics**

Variable (1-2) credits. May be repeated for a total of four credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Intensive reading and discussion of current topics in genetics.

#### **5616. Experiments in Bacterial Genetics**

Three credits. Prerequisite: Instructor consent.

Experiments in bacterial genetics emphasizing genetic manipulations using modern techniques for mutant isolation, DNA characterization and cloning. These include the use of transposons, DNA isolation, restriction analysis, gel electrophoresis, PCR and DNA sequencing. Each student conducts an independent project.

#### **5621. Molecular Biology and Genetics of Prokaryotes**

Three credits. Prerequisite: Instructor consent. Recommended preparation: a course in general microbiology.

Molecular genetics of bacteria, archaeobacteria, and their viruses. Transcription and replication of DNA, transformation, transduction, conjugation, genetic mapping, mutagenesis, regulation of gene expression, genome organization.

#### **5670. Theory and Practice of Laboratory Techniques in Microbiology**

Variable (1-2) credits. Prerequisite: Instructor consent. May be repeated for a total of five credits.

Trains participants in techniques, experimental design, sample preparation, quality control, and analysis of data encountered in microbiology laboratories. Taught as a series of modules with each focused on a different technique. With a change of content, may be repeated for credit.

#### **5671. Advanced Theory and Practice of Laboratory Techniques in Microbiology**

Variable (1-2) credits. Prerequisite: Instructor consent. May be repeated for a total of 10 credits.

Advanced training in microbiology related technologies such as next-generation sequencing and other "omic" techniques including experimental design, sample preparation, library preparation, quality control, analysis of large data sets and processing of large number of samples will be covered. The course is taught as a series of modules with each focused on a different technique. With change of content, may be repeated for credit.

#### **5672. Applied Bioinformatics**

Variable (1-2) credits. Prerequisite: Instructor consent.

Computational analysis of biological datasets. Lecture will cover background and theory. In the computer lab, sample data will be used to perform bioinformatics analysis. The course is taught as a series of modules with each focused on a different aspect.

#### **5679. Microbial Physiology**

Three credits. Prerequisite: Instructor consent.

Topics in microbial cell organization, growth, and intermediary metabolism with emphasis on specialized physiological adaptations.

#### **5681. Mechanisms of Bacterial Pathogenicity**

Three credits. Prerequisite: Instructor consent.

An in-depth examination of several host-parasite relationships as models of disease states.

#### **5699. Seminar in Microbiology**

One credit. May be repeated for a total of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Discussion of current topics in microbiology.

#### **5801. Scientific Writing and Project Development for MCB Graduate Students**

Two credits. Prerequisite: Open only to Molecular and Cell Biology Ph.D. students.

Instruction in the practice of scientific writing through group discussions and peer review during preparation of an application to the NSF Graduate Research Fellowship Program. Group discussions in related aspects of graduate student project development.

#### **5893. Special Topics in Cellular and Molecular Biology**

Variable (1-2) credits. May be repeated for a total of two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Selected topics in cellular and molecular biology presented by invited speakers.

#### **5895. Independent Study**

One credit. Prerequisite: Instructor consent. May be repeated for a total of four credits.

A reading course for those wishing to pursue special work in biology. It may also be elected by undergraduate students preparing to be candidates for degrees with distinction.

#### **5896. Investigation of Special Topics**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 24 credits.

Advanced study in a field within Molecular and Cell Biology.

#### **5899. Graduate Seminar**

One credit. May be repeated for a total of three credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

#### **6000. Rotations in MCB Laboratories**

One credit. Prerequisite: Open only to Molecular and Cell Biology graduate students. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Open only to students in MCB graduate programs with permission of the instructor. Provides entering graduate students with experience in three different laboratory settings during the first semester of graduate studies to assist with the selection of a research theme for their degree. Students are expected to participate in laboratory meetings, journal clubs, bench work, and other activities as defined by each of three host faculty members. Grading will be based on an aggregate of the performance in each of the host laboratories. Preference is given to students in the MCB doctoral program.

#### **6897. Research**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 24 credits.

Conferences and laboratory work covering selected fields of Molecular and Cell Biology.

## **Music (MUSI)**

#### **5300. Investigation of Special Topics**

Variable (1-3) credits. Prerequisite: Open only to Music graduate students; instructor consent. May be repeated for credit.

#### **5302. Analytic Techniques**

Three credits.

Structure and style in works from the 18th through the 20th Centuries.

#### **5305. Graduate Performing Ensemble**

One credit. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for credit.

Symphony Orchestra, Symphonic Wind Ensemble, Concert Band, Concert Choir, Chamber Singers, University Chorale, Voices of Freedom Gospel Choir, Jazz Ensemble, Jazz Lab Band.

#### **5306. Seminar in Opera Literature**

Three credits. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for credit.

Literature of the opera from the Early Baroque to the present. Course content can change from a general survey to a study of selected works by a composer, or works in a specific country or style period.

#### **5309. Seminar in Woodwind Literature**

Three credits. Prerequisite: Open only to Music graduate students, others with consent.

Historical development of the woodwind instruments; of representative solo and ensemble literature.

### 5319. Notation and Performance Practice

Three credits. Prerequisite: Open only to Music graduate students, others with consent.

Notation, ornamentation, and instrumentation from the middle ages through the classic period.

### 5323. Applied Music

Variable (1-7) credits. Prerequisite: Open only to Music graduate students; Participation in an appropriate major ensemble, advanced standing in performance, recommendation by an instructor in this department, and consent of the department head are required. May be repeated for credit.

The Applied Music fee is charged all students receiving private instrumental, vocal, or conducting instruction.

### 5324. Graduate Chamber Ensemble

One credit. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for a maximum of eight credits.

Study and performance of chamber music for various ensembles.

### 5325. Opera Theater

One credit. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for credit.

Study and performance of roles in major opera productions and/or work in production technique.

### 5330. Advanced Instrumental Conducting

Two credits. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for a maximum of eight credits.

Score study, conducting, and rehearsal techniques of selected instrumental literature.

### 5331. Conducting Seminar

One credit. May be repeated for a total of six credits.

Special topics in instrumental and choral conducting.

### 5345. Teaching Music at the College Level

Two credits.

Preparation for teaching music in higher education, in the studio, classroom, or rehearsal hall--with attention to late-adolescent development; elements of effective teaching, including legal considerations; pedagogical approaches; institutional contexts; seeking, securing, and beginning work in a position; and procedures for attaining promotion and tenure. Open to students beyond first-year master's level.

### 5348. Schenkerian Theory and Analysis

Three credits. Prerequisite: MUSI 5302; open to Music graduate students, others with consent.

Readings and analytical projects based on the theories of Heinrich Schenker and his followers.

### 5353. Theory Seminar

Three credits. Prerequisite: MUSI 5302; open to Music graduate students, others with consent. With a change in content, may be repeated for a maximum of nine credits.

Analysis of specific styles and the work of particular theorists: variable topics.

### 5354. Advanced Analysis

Three credits. Prerequisite: MUSI 5302; open to Music graduate students, others with consent.

Methods and models of music analysis applied to selected works from the Middle Ages to the 20th Century.

### 5359. History of Music Theory

Three credits. Prerequisite: MUSI 5302.

Speculative pedagogical and analytical thought on the music in theoretical treatises from antiquity to the twentieth century.

### 5364. Advanced Choral Techniques

Two credits. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for a maximum of eight credits.

Score study, conducting, and rehearsal techniques of selected choral literature.

### 5365. Choral Literature to 1600

Two credits. Prerequisite: Open only to Music graduate students, others with consent.

Historical-analytical study of choral compositions: c. 1000 A.D. to 1600.

### 5366. Choral Literature from 1600 to 1800

Two credits. Prerequisite: Open only to Music graduate students, others with consent.

Historical-analytical study of choral compositions: 1600 to 1800.

### 5367. Choral Literature from 1800 to Present

Two credits. Prerequisite: Open only to Music graduate students, others with consent.

Historical-analytical study of 1800 to the present.

### 5372. Wind Band Literature

Three credits. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for a maximum of 12 credits.

Historical-analytical study of music for wind ensemble and symphony band.

### 5373. Orchestra Literature

Three credits. Prerequisite: Open only to Music graduate students, others with consent.

Historical-analytical study of orchestral literature.

### 5379. Atonal Theory and Analysis

Three credits.

Set theoretic concepts and operations in applied twentieth-century music.

### 5391. Procedures in Historical Research

Three credits.

A project-oriented approach to bibliographic tools and research methods applicable to the historical study of music.

### 5397. Recital

One credit. May be repeated for a total of four credits.

### 6400. Tutorial in Music

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Concentrated individualized study and research.

### 6411. Seminar: The Life and Works of Individual Composers

Three credits. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for credit.

### 6412. Seminar: Style Periods in Music History

Three credits. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for a maximum of 12 credits.

### 6413. Seminar: History of Musical Forms

Three credits. Prerequisite: Open only to Music graduate students, others with consent. May be repeated for credit.

Sonata, concerto, madrigal, motet or other musical forms.

### 6491. Seminar: Advanced Research Procedures in Musicology

Three credits. Prerequisite: Open only to Music graduate students, others with consent.

Critical reading and original research in recent historical musicology.

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## Natural Resources and the Environment (NRE)

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### 5115. Field Methods in Hydrogeology

Three credits. Prerequisite: Not open for credit to students who have passed GEOL 5790.

Field methods associated with ground water and contamination assessments.

### 5135. Water Transport in Soils

Three credits.

Application of the principles of transport of water in soil for various physical properties of soils and fluids, initial conditions and boundary conditions. The differential equations describing the movement of energy and mass for both saturated and unsaturated flow conditions will be applied to soil evaporation and plant transpiration, infiltration and percolation of wetting fronts, and movement of tracers and chemical constituents of water. Both uniform flow and preferential flow will be examined.

### 5145. Environmental Biophysics

Three credits.

Gas laws and transport processes. Radiation environment. Momentum, heat, and mass transfer. Steady-state and transient energy balance. Microclimate of plants and animals. Physical and physiological interactions between plants/animals and their environment.

### 5155. Principles of Nonpoint Source Pollution

Three credits.

An advanced investigation of sources, impacts, modeling and management of nonpoint sources of water pollution.

### 5165. Advanced Ground Water Hydrology

Three credits. Prerequisite: Not open for credit to students who have passed GSCI 5710.

Covers ground water resource assessment, management and protection, understanding the flow of ground water in fractured rock, application of tracer studies in evaluating flow conditions.

### 5175. Climate and Environmental Systems Modeling

Three credits. Prerequisite: Instructor consent. Recommended preparation: Undergraduate Calculus I, II.

How physical processes in climate and environmental systems - such as atmospheric motion, hydrological processes and transport

of atmospheric constituents - are represented in numerical models. Topics include classification of numerical models, steps in climate and environmental (mathematical) modeling, conservation theories of mass and energy, mass balance equations, numerical techniques, and initial and boundary conditions.

#### **5200. Sustainable Natural Resources Management**

Three credits. Prerequisite: Instructor consent.

Explores social-ecological systems, including relationships between ecosystem services and human well-being and livelihoods; introduces systems theory for understanding disturbance, feedbacks, thresholds, directional change, adaptation and resilience in social-ecological systems; includes applied case studies in sustainable agriculture, fisheries, forestry, freshwater, marine, and wildlife.

#### **5205. Decision Methods in Natural Resources**

Three credits. Prerequisite: Instructor consent.

Aspects and methods of decision making for individuals, organizations, and institutions, including structured decision making, adaptive resource management, and organizational learning; concepts and techniques for managing risk and uncertainty, model-based and experience-based approaches to link alternative actions and consequences, tradeoff and optimization approaches, and monitoring and evaluation of resulting outcomes.

#### **5210. Communications for Environmental Decision Makers**

Three credits. Prerequisite: Instructor consent.

Methods and techniques for effective communication with diverse audiences using written, spoken, and digital media; includes conflict resolution, crisis situations, persuasion, negotiation, marketing and advocacy.

#### **5215. Geospatial Techniques for Environmental Management**

Three credits.

Introduction to collecting, managing, displaying, and analyzing geospatial data. Modules include geographic information systems (GIS), relational database management systems (RDBMS), Global Positioning System (GPS), geospatial modeling, geoprocessing tools.

#### **5220. Environmental Planning for Sustainable Communities and Regions**

Three credits. Prerequisite: Instructor consent.

Principles of environmental planning with application to human health, natural areas, working landscapes, and built environments; basis and context for planning, including laws, regulations, zoning, compliance, uncertainty, and risk management.

#### **5252. Physiology and Ecology of Trees**

Three credits. Prerequisite: Instructor consent.

An examination of the interactions between trees and their environment at the molecular, individual and forest stand scales. Lectures and reviews of current research span at least two spatial scales of organization for each course topic. Course topics include tree carbon balance, water relations, mineral nutrition, morphology, genomics, phenology, climate change and modeling.

#### **5325. Wildlife Management**

Variable (1-6) credits.

The application of ecological principles as practiced by natural resource agencies throughout North America.

#### **5335. Advanced Stream Ecology**

Variable (2-3) credits. Prerequisite: Instructor consent.

Introduction to the current state of knowledge and research in rivers and streams. Topics include both basic structure and function of stream habitats and biotic assemblages as well as branch into the management and conservation applications of ecological information. Term project and paper is required. Students with previous stream ecology coursework (such as NRME 3205) may take the course for two credits and attend the single weekly meeting. Students lacking a basic introduction to stream ecology may take the course for three credits and will attend NRME 3205 lectures in addition to the weekly meeting.

#### **5461. Landscape Ecology**

Three credits.

Interdisciplinary focus on the effect of landscape pattern on environmental processes and conditions and the influence of disturbance and underlying geomorphology on landscape pattern. Consideration of landscape ecology principles in planning and management of pattern and processes in which conservation and production land uses are intermingled.

#### **5555. GPS Surveying**

Three credits.

Theory and practice of global positioning system (GPS) surveying. Includes network design, control, geodetic coordinate systems, field collection of measurements, data processing, and interpretation of results.

#### **5575. Natural Resource Applications of Geographic Information Systems**

Four credits. Prerequisite: Instructor consent. Not open for credit to students who have passed NRE 4575.

The principles and applications of computer-assisted spatial data analysis in natural resources management will be covered. Both hypothetical and actual case studies of the use of geographic information systems (GIS) to solve natural resource problems will be discussed. Raster- and vector-oriented, microcomputer-based GIS software will serve as the hands-on tools for students.

#### **5585. Geospatial Data Processing Techniques**

Three credits.

Research approaches and techniques in geospatial analysis, enabling students to pursue integrated research in earth resources data geoprocessing applications. A variety of computer-based tools, including remote sensing, geographic information systems (GIS), and global positioning satellite (GPS), will be utilized in the acquisition, analysis, and presentation of digital earth resource data and information.

#### **5610. Technical Writing and LaTeX**

Variable (2-3) credits.

Students learn how to write technical articles and theses using the LaTeX document preparation system. Subjects include grammar, punctuation, technical-writing style elements, citations and

bibliographies, plagiarism, and LaTeX. Students are required to install LaTeX on a computer in order to complete assignments. English language learners may take the course for three units with permission of the instructor.

#### **5694. Natural Resources Seminar**

One credit. May be repeated for a total of four credits.

Active participation in weekly natural resources seminars given by invited speakers.

#### **5695. Special Topics in Natural Resources**

Variable (1-4) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Advanced topics in the field of natural resources. Topics and credits to be published prior to the registration period preceding the semester offerings.

#### **5698. Natural Resources Colloquium**

Variable (1-6) credits. May be repeated for a total of six credits.

Study and discussion of readings (journal articles, books, current research) on a selected topic in natural resources.

#### **5699. Independent Study**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

#### **5800. Graduate Seminar**

One credit. May be repeated for a total of four credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The mechanism of presenting and moderating a professional presentation. Topics include presentation, organization, speaking skills, use of media technology, formulation of questions, and moderator activities.

#### **6000. Research Methods in Natural Resources**

Three credits.

General research techniques, writing scientific articles and grant proposals, problem solving approaches, experimental design and modeling concepts, and research ethics.

#### **6135. Small Watershed Modeling**

Three credits.

Mathematical modeling of hydrologic processes in small watersheds and aquatic systems. Solutions of mass balance and flow relationships. Investigation of dynamic relationships among variables. Examples include infiltration, overland flow, channel routing, chemical transport and transformations, surface-subsurface interactions and biotic growth and degradation.

#### **6175. Ground Water Modeling Applications**

Three credits. Not open for credit to students who have passed GSCI 5720.

Application of Modflow to ground water flow and contaminant problems. Well head protection modeling.

#### **6450. Teaching Practicum**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Doctoral students in the Natural Resources: Land, Water, and Air program take primary

teaching responsibility for a course under the supervision of a faculty liaison.

## Nursing (NURS)

### 5000. Investigation of Special Topics

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

### 5001. Holistic Nursing Part 1: Basic Concepts

Three credits. Prerequisite: open only to Nursing graduate and certificate students; open to non-degree students who hold a bachelor's degree and RN with consent.

The curriculum in this three-course certificate program is designed for nurses interested in integrating holistic principles and evidence-based modalities in their professional practice. Students will learn about the state of the science in holistic care and the latest research on the efficacy and safety of a variety of complementary and alternative modalities (CAM). This course was developed around the five core values and scope and standards of holistic nursing and provides nurses with the educational foundation required to take the national board certification examination in holistic nursing. Teaching/learning interventions and CAM are selected as examples of nursing approaches to promote health and healing of patients. Every nurse who completes the three courses will receive a certificate.

### 5002. Holistic Nursing Part 2: Advanced Concepts

Three credits. Prerequisite: NURS 5001; open only to Nursing graduate students; open to non-degree students who are nurses with consent.

The curriculum in this three-course certificate program is designed for nurses interested in gaining a holistic perspective in nursing practice and everyday life and provides nurses with the educational foundation required to take the national board certification examination in holistic nursing. This course introduces students to advanced concepts in holistic nursing. Major concepts of health and wellness, body-mind healing, spirituality and health, selected complementary and alternative modalities (CAM), and evidenced-based practice are highlighted. Participants engage in experiential activities that explore and analyze a range of practices that are applicable for providing holistic care in a variety of health care settings. Every nurse who completes the three courses will receive a certificate.

### 5003. Holistic Nursing Practicum

Three credits. Prerequisite: NURS 5001; and NURS 5002, which may be taken concurrently.

Provides students with an opportunity to apply theory from holistic nursing to individuals, families, and community groups in a variety of health care settings. Focus is on relationship-centered holistic care and selected CAM modalities applied across the wellness-illness continuum in collaboration with other members of the health care team. Selected readings, clinical experiences, and practicum project are determined in collaboration with faculty.

### 5012. Nursing Science and Patterns of Knowing in Advanced Nursing Practice

Three credits. Prerequisite: open only to Nursing graduate students, others with consent.

An historical, contemporary and futuristic exploration of the art and science of nursing praxis including patterns of knowing: empirical, ethical, aesthetic, existential and emancipatory. Theories and models derived from nursing and the social sciences are synthesized for their usefulness in advanced practice nursing care for individuals, families, and communities to promote health and manage a variety of problems such as health threats, acute and chronic illnesses, and transitions. Opportunities are provided for students to synthesize family health concepts for use in clinical practice, scholarship, and research.

### 5020. Statistical Methods in Health Sciences Research

Three credits. Prerequisite: open only to Nursing graduate students; others with instructor consent.

Quantitative procedures including descriptive and inferential statistics, non-parametric approaches to data, and parametric analyses. Selected research designs are explored. Analytic techniques are applied for use in selected research designs in health sciences research.

### 5030. Nursing Research for Evidence Based Practice

Three credits. Recommended preparation: NURS 5020.

Examination of qualitative and quantitative methods of primary research employed to answer questions in nursing practice. Concepts include patient safety and quality principles, quality/process improvement, and evidence-based practice processes. Emphasis is on problem identification; design principles; and accessing, analyzing, disseminating and applying research for evidence-based practice.

### 5060. Advanced Pathophysiology: Concepts for Advanced Nursing Practice Across the Lifespan

Three credits.

Designed for nurses preparing for advanced nursing practice roles across varying population foci. Concepts will include advanced human physiology, pathophysiology, and common clinical manifestations. A body-systems framework will be used.

### 5062. Advanced Health Assessment across the Lifespan

Three credits. Prerequisite or corequisite: NURS 5060; open only to Nursing graduate students, others with consent.

Principles and techniques of advanced health assessment across the life span are examined and practiced. Lab fee of \$250 added to student's fee bill.

### 5070. Advanced Pharmacodynamics and Implications for Nursing Actions

Three credits. Prerequisite: NURS 5060.

Emphasis is placed on pharmacodynamics, on nursing measures that support desired drug responses or reduce side effects that must be tolerated, and on client teaching indicated by pharmacotherapy.

### 5089. Quality and Microsystems

Four credits. Prerequisite: NURS 5011 or 5012, and NURS 5060, 5070, 5030, 5020, 5062, 5865 and 5885; NURS 5865 and 5885 may be taken concurrently. May be repeated once for credit.

The didactic portion of the course introduces quality improvement methods used in microsystems; and the role of the Clinical Nurse Leader as a leader, educator, and advocate for safe, cost effective quality care. The clinical practicum (100 hours) focuses on completing a quality improvement assessment of a microsystem using the 5-Ps approach.

### 5095. Individualized Study

Variable (1-6) credits.

Description will vary depending on the needs/goals for each occurrence.

### 5098. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated credit.

### 5099. Clinical Nurse Leader Role, Quality and Clinical Immersion

Four credits. Prerequisite: NURS 5089.

Didactic (0.25 credit) and clinical (3.75 credit) course focusing on demonstration of CNL competencies for planning and implementing a quality improvement project using a theoretical framework, culminating in a 300-400 hour clinical immersion experience which includes the management of the quality project as identified in NURS 5089.

### 5101. Fundamental Mechanisms of Acute and Chronic Pain

Three credits. Recommended preparation: background in nursing or other health or allied health training.

An exploration of physiological processes involved in pain transmission as well as the psychological, emotional, and cognitive processes that modulate pain experience based on the current literature using both animal and human pain models.

### 5102. Basic and Clinical Pain Research

Three credits. Prerequisite: NURS 5101.

Exploration of the methods and models (both basic and clinical) used to study pain.

### 5103. Pharmacology of Pain and Analgesia

Three credits. Recommended preparation: background in nursing or other health or allied health training.

The pharmacological processes underlying normal and pathological pain states, and will build upon this knowledge to gain an understanding of the pharmacotherapies currently utilized for the treatment of pain and their shortcomings. Particular emphasis will also be placed on the concept of individualized care and developing technologies within this realm.

### 5104. Pain Assessment and Management

Three credits. Prerequisite: NURS 5101 and 5102.

This seminar-based course comprised of seminars by clinicians and pain scientists will evaluate, integrate and translate findings from primary literature into evidence-based practice.

### 5150. Common and Chronic Health Problems in APN Practice II

Three credits. Prerequisite within six months or corequisite: NURS 5400 and 5409.

Grounded in theory and evidence, this didactic clinical course focuses on application of critical thinking skills necessary to achieve advanced practice nursing core competencies and

domains. The emphasis is on health promotion and maintenance, and assessment, diagnosis and management of common and chronic health problems while considering context for populations, including individuals, families, and communities, specific to the adult-gerontology acute care, adult-gerontology primary care, and family nurse practitioner.

**5160. Common and Comorbid Health Problems in AGNP Acute Care Practice III**

Three credits. Prerequisite: NURS 5400 and 5409; NURS 5150 within six months. Corequisite: NURS 5169.

Incorporating theory and evidence, this didactic clinical course focuses on integration of critical thinking skills necessary to achieve advanced practice nursing core competencies and domains. The emphasis is on risk reduction and acute care assessment, diagnosis and management of common and co-morbid acute health conditions while considering context among populations, including individuals, families, and communities, specific to the adult-gerontology acute care nurse practitioner. Taken by all students in the adult-gerontology acute care track.

**5169. AGNP Acute Care Clinical Practicum II**

Three credits. Prerequisite: NURS 5400, 5409, and 5150, all within six months. Corequisite: NURS 5160. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Clinical Practicum and seminar course that focuses on integration of critical thinking and psychomotor skills necessary to achieve advanced practice nursing core competencies and domains in the acute care clinical setting. Integrates content and clinical experiences from all previous acute care didactic and practicum courses with an emphasis on considering context while providing risk reduction and assessment, diagnosis and management of common and co-morbid health problems among populations, including individuals, families, and communities, specific to the adult-gerontology acute care nurse practitioner. Credits include seminar and 16 hours of clinical per week (240hr/semester). Taken by all students in the adult-gerontology acute care nurse practitioner track. A grade of B (83%) or higher in this course is required to progress to the next level.

**5170. Complex and Comorbid Health Problems in AGNP Acute Care Practice IV**

Three credits. Prerequisite: NURS 5160 and 5169 within six months. Corequisite: NURS 5179.

Grounded in theory and evidence, this didactic clinical course focuses on synthesis of critical thinking skills necessary to achieve advanced practice nursing core competencies and domains. The emphasis is on risk reduction and acute care assessment, diagnosis and management of more complex and co-morbid acute health conditions while considering context among populations, including individuals, families, and communities, specific to the adult-gerontology acute care nurse practitioner. Taken by all students in the adult-gerontology acute care track.

**5179. AGNP Acute Care Clinical Practicum III**

Three credits. Prerequisite: NURS 5160 and 5169 within six months. Corequisite: NURS 5170. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Clinical practicum and seminar course that focuses on synthesizing critical thinking and psychomotor skills necessary to achieve advanced practice nursing core competencies and domains in the acute care clinical setting. Synthesizes content and clinical experiences from all previous acute care didactic and practicum courses with an emphasis on considering context while providing risk reduction and assessment, diagnosis and management of more complex acute health problems among populations, including individuals, families, and communities, specific to the adult-gerontology acute care nurse practitioner. Credits include seminar and 16 hours of clinical per week (240hr/semester). Taken by all students in the adult-gerontology acute care practitioner track.

**5350. Advanced Neonatal Embryology/Physiology**

Three credits. Corequisite: NURS 5060.

Examines fetal, transitional, and neonatal physiology. Embryology is also discussed, as the basis for neonatal development.

**5362. Advanced Health Assessment across the Lifespan: Neonatal Section**

Three credits. Prerequisite: NURS 5060 and 5350. Corequisite: NURS 5365 and 5370.

Enable students to put into practice the principles and skills needed for advanced health assessment of the neonate.

**5365. Advanced Neonatal Nursing Theory I**

Three credits.

The purpose of this first clinical course is to introduce the role of the neonatal nurse practitioner clinician in the management of normal and high-risk families and infants. The focus of the course is to develop skills in the physical and psychosocial assessment of high-risk childbearing families during all phases of the childbearing process: antenatal, intrapartum, postpartum, and the neonatal period. Special emphasis will be placed on events during the antenatal, intrapartum, and postpartum periods that impact the neonate.

**5369. Advanced Neonatal Practicum I**

Two credits. Prerequisite: NURS 5060, 5350, 5362, 5365 and 5370. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Focus of this practicum is the assessment and management of moderately ill infants and their families.

**5370. Advanced Pharmacodynamics and Implications for Nursing Actions: Neonatal Section**

Three credits.

Emphasis is placed on neonatal pharmacodynamics, on nursing measures that support desired drug responses or reduce side effects that must be tolerated.

**5375. Advanced Neonatal Nursing Theory II**

Three credits. Prerequisite: NURS 5369. Corequisite: NURS 5379.

Focuses on the acquisition and application of in-depth physiological and psychological knowledge to the nursing care of high-risk neonates and their families. Emphasis is placed on the role of the advanced practice nursing management of high-risk neonatal populations.

**5379. Advanced Neonatal Practicum II**

Three credits. Prerequisite: NURS 5365 and 5369. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The focus of this practicum is the assessment and management of high-risk neonates and families.

**5385. Advanced Neonatal Nursing III**

Three credits. Prerequisite: NURS 5375 and 5379. Corequisite: NURS 5389.

Focuses on the components essential for preparation of students for advanced practice in neonatal nursing.

**5389. Advanced Neonatal Practicum III**

Three credits. Prerequisite: NURS 5379 Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Assessment and management of critically ill high-risk neonates and their families.

**5400. Health Promotion, Prevention, and Common Health Problems in APN Practice I**

Three credits. Prerequisite: NURS 5062 within six months. Prerequisite or corequisite: NURS 5070.

Grounded in theory and evidence, this initial didactic clinical course focuses on development of critical thinking necessary to achieve advanced practice nursing core competencies and domains. The emphasis is on health promotion, disease prevention, risk reduction, and assessment, diagnosis and management of common health problems while considering context for populations, including individuals, families, and communities, specific to the adult-gerontology acute care, adult-gerontology primary care, and family nurse practitioner. Taken by all students in adult-gerontology acute care, adult-gerontology primary care, and family nurse practitioner tracks. A fee is added to the fee bill for clinical tracking online. A grade of B (83%) or higher in this course is required to progress to the next level.

**5409. APN Clinical Practicum I**

Three credits. Prerequisite: NURS 5062 within six months. Corequisite: NURS 5400. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Initial clinical practicum and seminar focusing on developing critical thinking and psychomotor clinical skills necessary to cultivate advanced practice nursing core competencies and domains in a clinical practice setting. The emphasis is on considering context while providing health promotion, disease prevention, risk reduction, and clinical assessment, diagnosis and management of common health problems for populations, including individuals, families, and communities, specific to the adult-gerontology acute care, adult-gerontology primary care, and family nurse practitioner. The role of the nurse practitioner in the current healthcare system is examined. Credits include seminar and 16 hours of clinical per week (240hr/semester). Taken by all students in adult-gerontology acute care, adult-gerontology primary care, and family nurse practitioner tracks.

**5410. Common and Comorbid Health Problems in APN Primary Care Practice III**

Three credits. Prerequisite: NURS 5400, 5409, and 5150, all within six months.

Grounded in theory and evidence, this didactic clinical course focuses on integration

of critical thinking skills necessary to achieve advanced practice nursing core competencies and domains. The emphasis is on health promotion and maintenance, and primary care assessment, diagnosis and management of common and co-morbid health conditions while considering context for populations, including individuals, families, and communities, specific to the adult-gerontology primary care and family nurse practitioner. Taken by all students in adult-gerontology primary care and family nurse practitioner tracks. A grade of B (83%) or higher in this course is required to progress to the next level.

#### **5419. AGNP Primary Care Clinical Practicum II**

Three credits. Corequisite: NURS 5410. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Clinical Practicum and seminar course that focuses on integration of critical thinking and psychomotor skills necessary to achieve advanced practice nursing core competencies and domains in the primary care clinical setting. Integrates content and clinical experiences from all previous primary care didactic and practicum courses with an emphasis on considering context while providing health promotion and maintenance, and assessment, diagnosis and management of common and co-morbid health problems among populations, including individuals, families, and communities, specific to the adult-gerontology primary care nurse practitioner. Credits include seminar and 16 hours of clinical per week (240hr/semester). Taken by all students in the adult-gerontology primary care nurse practitioner track. A grade of B (83%) or higher in this course is required to progress to the next level.

#### **5420. Complex and Comorbid Health Problems in APN Primary Care Practice IV**

Three credits. Prerequisite: NURS 5410 within six months.

Grounded in theory and evidence, this didactic clinical course focuses on synthesis of critical thinking skills necessary to achieve advanced practice nursing core competencies and domains. The emphasis is on health promotion and maintenance, and primary care assessment, diagnosis and management of more complex and co-morbid health conditions while considering context for populations, including individuals, families, and communities, specific to the adult-gerontology primary care and family nurse practitioner. Taken by all students in adult-gerontology primary care and family nurse practitioner tracks. A grade of B (83%) or higher in this course is required to graduate.

#### **5429. AGNP Primary Care Clinical Practicum III**

Three credits. Prerequisite: NURS 5410 within six months. Corequisite: NURS 5420. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Clinical practicum and seminar course that focuses on synthesizing critical thinking and psychomotor skills necessary to achieve advanced practice nursing core competencies and domains in the primary care clinical setting. Synthesizes content and clinical experiences from all previous primary care didactic and practicum courses with an emphasis on considering context while providing health promotion and maintenance, and assessment, diagnosis and management of more

complex and co-morbid health problems among populations, including individuals, families, and communities, specific to the adult-gerontology primary care nurse practitioner. Credits include seminar and 16 hours of clinical per week (240hr/semester). Taken by all students in the adult-gerontology primary care and family nurse practitioner tracks. A grade of B (83%) or higher in this course is required to progress to the next level.

#### **5430. Management of Childbearing Women and Children**

Three credits. Prerequisite: NURS 5400 and 5409 within six months; NURS 5150, which may be taken concurrently.

The focus of this course on health promotion/disease prevention and clinical diagnosis and management of management of childbearing women and children. In addition, common acute and chronic health problems will be addressed.

#### **5439. FNP Primary Care Practicum II**

Three credits. Prerequisite: NURS 5430 within six months. Corequisite: NURS 5410. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Clinical Practicum and seminar course that focuses on integration of critical thinking and psychomotor skills necessary to achieve advanced practice nursing core competencies and domains in the primary care clinical setting. Integrates content and clinical experiences from all previous primary care didactic and practicum courses with an emphasis on considering context while providing health promotion and maintenance, and assessment, diagnosis and management of common and co-morbid health problems among populations, including individuals, families, and communities, specific to the family nurse practitioner. Credits include seminar and 16 hours of clinical per week (240hr/semester). Taken by all students in the family nurse practitioner track. A grade of B (83%) or higher in this course is required to progress to the next level.

#### **5440. Advanced Practice Nursing Abroad**

2.5 credits. Prerequisite: NURS 5400, 5409, and 5150.

Focus is on health promotion/disease prevention and the clinical diagnosis and management of individuals/families experiencing chronic health problems in varied clinical settings providing care for diverse cultural groups. The role of the nurse practitioner is examined with a focus on cultural competency and sensitivity. Includes seminar and clinical hours.

#### **5449. FNP Primary Care Practicum III**

Three credits. Prerequisite: NURS 5410 and 5439, both within six months. Corequisite: NURS 5420. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Clinical practicum and seminar course that focuses on synthesizing critical thinking and psychomotor skills necessary to achieve advanced practice nursing core competencies and domains in the primary care clinical setting. Synthesizes content and clinical experiences from all previous primary care didactic and practicum courses with an emphasis on considering context while providing health promotion and maintenance, and assessment, diagnosis and management of more complex and co-morbid health problems among

populations, including individuals, families, and communities, specific to the family nurse practitioner. Credits include seminar and 16 hours of clinical per week (240hr/semester). Taken by all students in the family nurse practitioner track. A grade of B (83%) or higher in this course is required to progress to the next level.

#### **5700. Health Professions Education: Evaluation**

Three credits. Prerequisite: Master's or doctoral degree.

Introduction to important principles of evaluation science, with a particular emphasis on formative and summative evaluations. Will help students apply these principles to the practice of evaluating educational activities for health care professionals in various stages of education and training.

#### **5710. Health Professions Education: Planning**

Three credits. Prerequisite: Master's or doctoral degree.

Introduction to important principles of educational planning, reflecting the literatures of adult learning, curriculum and instruction, diffusion of innovations research, and health professions education. The course will help students apply these principles to the practice of planning educational activities for health care professionals in various stages of education and training.

#### **5720. Health Professions Education: Implementation**

Three credits. Prerequisite: Master's or doctoral degree.

Introduction to important principles of implementation reflecting the literatures of adult learning, curriculum and instruction, and health professions education. The course will help students apply these principles to the practice of implementing educational activities for health care professionals in various stages of education and training.

#### **5811. Application of Genetics to Healthcare**

Three credits. Prerequisite: open only to Nursing graduate students, others with consent.

The role of the Human Genome Project in genetic diagnostics, health promotion, disease prevention, therapeutic interventions and counseling, as well as the mechanisms of genetic inheritance and the genetic contribution to common and complex disorders, will be analyzed using a multidisciplinary context. Students will evaluate the ethical, financial, cultural, moral and legal issues that arise using case study discussion and analysis to augment didactic knowledge.

#### **5845. Health Services Statistics & Research Methods for the Scholarship of Application**

Three credits. May be repeated for a total of six credits.

Encompasses elements of needs assessment, statistics, research methods/design, and epidemiology/populations health serving as the foundation for subsequent development of clinical scholarship.

#### **5850. Scientific and Theoretical Underpinnings for the Scholarship of Application**

Three credits.

Exploration of foundational theories applicable to the practice arena. Topics include Systems

theory, organizational development theory, complexity theory, social world's theory, nursing mid-range theory and nursing models of evidence-based practice.

**5855. Evidence-Based Practice for the Scholarship of Application**

Three credits.

Development of skills in the translation, application, and evaluation of research, with an emphasis on evidenced-based practice. Skills in the integration of knowledge from diverse sources and disciplines and its application to solve clinical problems and improve health outcomes.

**5860. Quality and Organizational/Systems Leadership for the Scholarship of Application**

Three credits. Prerequisite: Open only to Nursing graduate students.

Assessment and diagnosis of organizations, facilitation of system-wide change, development of political skill for change, engagement in the process of quality and performance improvement methodologies, and application of leadership theory within organizations.

**5865. Information Systems for the Scholarship of Application**

Three credits.

Evaluation and use of information systems/technology and patient care technology supportive of clinical and administrative decision-making relevant to patient care, care systems, and quality improvement.

**5869. Doctor of Nursing Practice Residency and Seminar I**

Variable (3-5) credits. Prerequisite: NURS 5845, 5850, 5855, and 5895; instructor consent. May be repeated for a total of six credits. Students will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The first of three residency and seminar courses, this course requires the student to complete a nursing practicum in the specialty area of their choice with hours as necessary for total of 1,000 post-BSN. Students must complete a doctoral residency and participate in seminars. Students develop individual objectives to support their identified DNP project, and, in collaboration with the agency, preceptor and DNP project committee, plan their DNP project.

**5870. Health Policy and Populations-based Advocacy for the Scholarship of Application**

Three credits. Prerequisite: Open only to Nursing graduate students, others with consent.

The role of collaborative health care teams in health promotion and risk reduction and illness prevention for population health. Educational strategies necessary for transformation of clinical education to decrease preventable deaths will be incorporated.

**5879. Doctor of Nursing Practice Residency and Seminar II**

Variable (3-5) credits. Prerequisite: NURS 5869; instructor consent. May be repeated for a total of six credits. Students will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The second of three residency and seminar courses. Students complete a doctoral residency and participate in seminars. Students implement

their identified DNP project in collaboration with the agency and preceptor.

**5885. Leadership and Management for the Scholarship of Application**

Three credits.

Encompasses elements of leadership development, advanced practice management issues, and financial planning including budgeting and business planning.

**5889. Doctor of Nursing Practice Residency and Seminar III**

Variable (3-5) credits. Prerequisite: NURS 5879; instructor consent required. May be repeated for up to six credits. Students will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The third of three residency and seminar courses. Students complete a doctoral residency and participate in seminar. Students evaluate their identified DNP project in collaboration with the agency and preceptor.

**5895. Doctor of Nursing Practice Seminar Series for the DNP Project**

Variable (1-9) credits. Prerequisite: Instructor consent. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Designed to assist students with the DNP Project.

**6100. Philosophy of Science in Nursing**

Three credits.

A critical examination of the meanings, methods, and logical structure of science. Contemporary and historical views pertaining to the nature of truth, explanation, law, theory and methodology will be analyzed and compared. Examples drawn from nursing epistemology as well as that of other disciplines will be utilized to depict the presuppositions of modern science.

**6101. Grantsmanship: The Pursuit of Scholarly Support**

Variable (1-3) credits. Prerequisite or corequisite: NURS 6130, 6115, and 6145; instructor consent.

Introduction to the process of securing grants. Practical application is stressed to enhance the development of skills needed to secure funding for scholarly research endeavors.

**6115. Experimental Design and Analysis in Nursing Research**

Three credits. Prerequisite: NURS 6100; open only to Nursing doctoral students, others with consent.

Study and application of quantitative research methods from design through statistical analysis for experimental designs in nursing and healthcare. Options for the structures of experimental designs and techniques of data analysis appropriate to experimental studies of varying complexity, including emerging research methodologies, will be addressed. Students will conduct a pilot study using the most appropriate experimental design.

**6129. Quantitative Methods for Design and Analysis in Nursing Research I**

Three credits. Prerequisite: Master's level course in applied statistics equivalent to NURS 5020; open only to Nursing doctoral students.

First course in a three-semester sequence that focuses on the study and application of quantitative research methods from design through statistical analysis for experimental, quasi-

experimental, and non-experimental designs in nursing and healthcare. Options for the structures of experimental designs appropriate to research in nursing and healthcare will be emphasized, including a study of theories and methods of instrument development to support such designs. An introduction to methods for multivariate statistical analysis will occur concurrently.

**6123. Quantitative Methods for Design and Analysis in Nursing Research II**

Three credits. Prerequisite: NURS 6122; open only to Nursing doctoral students, others with consent.

Second course in a three-semester sequence that focuses on the study and application of quantitative research methods from design through statistical analysis for experimental, quasi-experimental, and non-experimental designs in nursing and healthcare. Limitations to the justification/feasibility of applying an experimental approach to human subjects will be reviewed. Research methods for quasi and non-experimental designs in nursing and healthcare will be emphasized. Basic psychometric properties and statistical methods underlying instrument development will be presented.

**6125. Quantitative Methods for Design and Analysis in Nursing Research III**

Three credits. Prerequisite: NURS 6123; open only to Nursing doctoral students, others with consent.

Third course in a three-semester sequence that focuses on the study and application of quantitative research methods from design through statistical analysis for experimental, quasi-experimental, and non-experimental designs in nursing and healthcare. Techniques of data analysis appropriate to study designs of varying complexity will be explored as well as emerging innovations in research methods. The theory and methods of meta-analysis will be introduced.

**6130. Introduction to Qualitative Methodology**

Three credits.

Designed for students in nursing and other disciplines to achieve an introductory level of expertise in selected qualitative approaches. Expected course outcome is a completed qualitative project.

**6135. Exploring the Nature of Nursing Knowledge**

Three credits. Prerequisite: NURS 6100; open only to Nursing doctoral students, others with consent.

The course is a critical examination of the development of nursing's disciplinary knowledge as it relates to the nature of nursing and its epistemic, ontologic, and ethical claims. This examination will include historical analysis and evaluation of nursing's meta-paradigm (meta language), conceptual models, and theories both grand and middle range.

**6145. Quasi and Non-Experimental Design and Analysis in Nursing Research**

Three credits. Prerequisite: NURS 6115.

The application of quantitative research methods from design through statistical analysis for quasi and non-experimental designs in nursing and healthcare. Options for the structures of quasi and non-experimental designs and techniques of data analysis appropriate to studies of varying complexity, including emerging research method innovations, will be addressed. Limitations to the

justification/feasibility of applying an experimental approach to human subjects will be included.

#### **6150. Instrument Development in Nursing**

Three credits.

Study of the theories and methods of instrument development as applied to nursing. The basic psychometric properties to be assessed and built into a useful measure for clinical or research applications are explored.

#### **6160. Advanced Qualitative Methods**

Three credits. Prerequisite: NURS 6130.

This seminar is designed for students in nursing and other disciplines to achieve an advanced level of expertise in selected qualitative approaches. Expected course outcome is a completed qualitative project.

#### **6165. Mixed Methods in Nursing Research**

Three credits. Prerequisite: NURS 6145 and 6160.

Presents mixed methods as a third paradigm that combines and complements the qualitative and quantitative approaches traditionally used in nursing research. Theoretical, paradigmatic, and programmatic issues, as well as practical application will be discussed.

#### **6175. Advancing Nursing Knowledge Development**

Three credits. Prerequisite: NURS 6135.

Critical application of nursing knowledge to nursing research. Each student will identify and justify the epistemology, theoretical perspective, methodology, and methods that will provide a scaffold for his/her dissertation topic.

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## Nutritional Sciences (NUSC)

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#### **5100. Concepts of Nutrition**

Two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

An introduction to the broad field of nutrition. Intended for entering graduate students, the course provides a conceptual framework for research and study in the nutritional sciences.

#### **5200. Macronutrient Metabolism**

Three credits. Prerequisite: MCB 5001.

The digestion, absorption/transport and metabolism of carbohydrates, protein/amino acids and lipids; their functions, metabolic pathways and interrelationships; mechanisms regulating their metabolism; methodologies for studying metabolism and assessing nutrient requirements in man and animals.

#### **5300. Vitamins and Minerals**

Three credits. Prerequisite: MCB 5001.

Comprehensive study of vitamins, trace elements, and selected macrominerals, including biochemical function(s), metabolic pathways, interactions, and toxicities.

#### **5390. Field Work on Community Nutrition**

Variable (1-6) credits.

Supervised field studies of community nutrition problems and visits with community agencies and families. Readings, conferences and reports required.

#### **5394. Seminar**

One credit. Prerequisite: NUSC 5100. May be repeated for a maximum of four credits.

Students develop the skills required for the analysis and presentation of current literature and research problems.

#### **5398. Special Topics in Nutrition**

Variable (1-6) credits. Prerequisite: Instructor consent.

Advanced study in a given area of nutritional science.

#### **5399. Independent Study in Nutritional Science**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Research problems or critical review of literature in any area of nutrition.

#### **5500. Food Colloids and Nanotechnology**

Three credits. Recommended preparation: NUSC 5200.

Comprehensive study on properties and structures of food colloids, including lipids, proteins and carbohydrates, from nanotechnology perspective. Development of food colloids-based nanoscale systems for applications in the context of food and nutrition.

#### **6311. Regulation of Food Intake and Energy Balance**

Three credits. Prerequisite: NUSC 5200.

Central and peripheral regulation of energy balance and how this affects body weight and risk for chronic disease. Relative contribution of genetic and metabolic factors, diet, and exercise on the pathophysiology of obesity.

#### **6313. Nutrition and Gene Expression**

Three credits. Prerequisite: MCB 5001.

Regulation of eukaryotic gene expression by specific nutrients, hormones, and metabolites. Transcriptional, post-transcriptional, and translational mechanisms.

#### **6315. Lipid Metabolism in Health and Disease**

Three credits.

Comprehensive study of lipid and lipoprotein metabolism. Influence of diet, drugs, exercise and obesity. Overview of relationship between genetics, lifestyle factors and chronic disease.

#### **6317. Nutritional Epidemiology**

Three credits. Prerequisite: Instructor consent.

Principles and applications of nutritional epidemiology with emphasis on research design.

#### **6319. Research Design and Methods in Nutritional Sciences**

Three credits. Prerequisite: NUSC 5200 and 5300.

Basic concepts and methodologies of research in public health and nutritional sciences, research proposal writing and in-class presentation.

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## Operations and Information Management (OPIM)

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#### **5103. Managerial Statistics**

Three credits. Prerequisite: Open only to graduate business students, others with consent. Not open for credit to students who have passed BADM 5181.

Covers some of the more familiar classical inference procedures and the basic statistical

concepts that are often essential to the interpretation of business data. Methods of understanding variability, and detecting changes are explored using descriptive, exploratory, and inferential statistics found in widely available statistical packages. Topics include: discrete and continuous random variables, sampling, confidence intervals, hypothesis testing, and linear regression.

#### **5110. Operations Management**

Three credits. Prerequisite: OPIM 5103 or 5603; open only to MBA and MSBAPM students, others with consent. Not open for credit to students who have passed OPIM 5184.

An operations manager is concerned with designing, operating and controlling a system for producing goods and services. Design decisions include selecting a process technology, organizing jobs, selecting vendors, and developing the location and layout of facilities. Operating the system involves planning and scheduling work and material flow, controlling quality, and managing inventories. General systems concepts and models are developed and applied. Topics include process flow analysis, inventory systems, waiting line analysis, quality design, capacity resource planning, project management, and integrating operations with the firm's strategic plans.

#### **5165. Management Information Systems**

Three credits. Prerequisite: Open only to MBA and MSBAPM students, others with consent. Not open for credit to students who have passed OPIM 5182.

Emphasis on business applications and how to structure the development and use of information systems for maximum benefit to the organization. Topics include: decision support systems, impact of the computer upon individual and organizations, competitive implications, technology change, telecommunications, and control of information systems resources.

#### **5181. Introduction to Data Analytics**

1.5 credits. Prerequisite or corequisite: BADM 5180.

Introduction to key issues and concepts in data analytics. Begins by delineating the differences between standard statistical analysis, including model estimation and evaluation, and the data driven approach of data analytics. A good deal of emphasis is placed on critical issues underlying almost all data analytics projects, including data quality (accuracy, objectivity, and reliability), missing values, outliers, and data standardization. Introduction to basic analytics techniques and processes.

#### **5182. Management Information Systems**

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open to students who have passed BLAW 5182.

Information technology (IT) has had a dramatic impact on how individuals and organizations work, and is an important force shaping entire industries and value creation by firms. Most business school graduates will have IT related responsibilities during their careers, no matter which functional area they are in, and will be involved in efforts to select, adopt, and exploit information technologies in support of business goals. The goal of this course is to prepare students to execute these responsibilities effectively, and to be able to do so even as the set of available technologies changes over time. The

course presents students with frameworks that let them analyze business situations involving IT in a structured way. It will also help them develop sophisticated understanding of the links between IT, business strategy, and business process. They will also gain an appreciation of the organizational and management practices that complement IT investments.

### **5183. Introduction to Operations Management**

1.5 credits. Corequisite: BADM 5181; open only to students in the full-time MBA program.

Overview and introduction to operations management. Focus on the process view of operations and develops a framework for process analysis and improvement with and without variability.

### **5184. Operations and Supply Chain Management**

1.5 credits. Prerequisite: OPIM 5183.

Built on the previous module, covers critical and specific topics in operations management, including inventory, quality, lean operations, and operations across firms (supply chains). It introduces both qualitative strategies and quantitative models concerning these topics.

### **5185. Introduction to Data Analytics and Managing Information Systems**

Three credits. Prerequisite: BADM 5103 or OPIM 5103. Not open for credit to students who have passed OPIM 5165, 5181, or 5182.

Introduction to key issues and concepts in data analytics. Delineates differences between standard statistical analysis, including model estimation and evaluation, and the data driven approach of data analytics. Emphasis on critical issues underlying almost all data analytics projects, including data quality (accuracy, objectivity, and reliability), missing values, outliers, and data standardization. Introduction to basic analytics techniques and processes. Prepares students to execute IT-related responsibilities effectively, and to be able to do so even as the set of available technologies changes over time. Presents students with frameworks that let them analyze business situations involving IT in a structured way. Students will develop sophisticated understanding of the links between IT, business strategy, and business process. Students will also gain an appreciation of the organizational and management practices that complement IT investments.

### **5270. Introduction to Project Management**

Three credits. Prerequisite: Open only to MBA and MSBAPM students, others with consent.

Examines the project management process and the management of a portfolio of projects, with focus on techniques to overcome the pitfalls and obstacles that frequently occur during a typical project. Designed for business leaders responsible for implementing projects, as well as beginning and intermediate project managers.

### **5272. Business Process Modeling and Data Management**

Three credits. Prerequisite: Open only to MBA and MSBAPM students; instructor consent.

Introduction to market-leading techniques that help to identify and manage key data from business processes. Provides the essential tools required for data mining and business process re-engineering.

Combines lecture, class discussion and hands-on computer work in a business-oriented environment.

### **5500. Field Study Internship**

Three credits. Prerequisite: Instructor consent. International students must have completed both a spring term and a fall term prior to taking this course. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Gives students real-world experiences in applications of analytics and/or project management through an internship or industry project undertaken individually with a company under the joint supervision of a faculty member and the student's field supervisor. Student performance will be evaluated on the basis of an appraisal by the field supervisor and a detailed written report submitted by the student.

### **5501. Visual Analytics**

Three credits. Prerequisite: OPIM 5604.

Explores techniques and best practices in visualizing data. From simple cross tabs to more complex multi-dimensional analysis, explores why particular data visualizations can better illustrate patterns and correlations inherent in the data itself. Examines cognitive function and its role in data visualization designs; showing that data visualization can reveal answers and questions alike. Utilizing state of the art software, the use of parameters, filters, calculated variables, color, space and motion to visually articulate the data are surveyed. The use of dashboards to quickly reveal data-driven information that has daily relevance to executives, managers, supervisors and line personnel are investigated. Common pitfalls in visualization design and why less is often more are considered.

### **5502. Big Data Analytics with Hadoop**

Three credits. Prerequisite: OPIM 5604 and 5272.

In-depth, hands-on exploration of various cutting-edge information technologies used for big data analytics. The first half focuses on using big data management techniques for ETL (extract-transform-load) operations. The second half focuses on using big data analytics tools for data mining algorithms including classification, clustering, and collaborative filtering. Extremely hands-on, requiring students to spend significant time working with large datasets. Students are expected to have taken at least one course in data modeling and one course in data mining (please see pre-requisites) or have significant related work experience. Students should expect to become familiar with the Unix operating system, as well as with programming in Python. Students may be required to install some software on your computers on your own, with very little support, if any, from the instructor or anyone else. Students should be willing to troubleshoot any issues during installation, drawing help from Google searches.

### **5503. Data Analytics using R**

Three credits. Prerequisite: OPIM 5604.

Helps students develop proficiency in data analytics using R for statistical inference, regression, predictive analytics, data mining, and Text mining: analyzing twitter and social network data. Combines lectures, hands-on exercises, business case discussions, and student presentations in a professional environment.

### **5504. Adaptive Business Intelligence**

Three credits. Prerequisite: OPIM 5604, 5641, and 5272.

The use of techniques from statistics and optimization to implement ABI systems. Introduction to the fundamentals of decision support systems, genetic algorithms, ABI systems, and their applications to diverse management contexts. Students will learn how to use tools such as Excel VBA, Evolutionary Solver, and RExcel (R language for statistical analysis) to develop ABI applications.

### **5505. Analytical Consulting for Financial Services**

Three credits. Prerequisite: OPIM 5641 or BADM 5181.

Exposes students to a wide array of real consulting situations in business analytics operations and financial services, and will teach students methods of addressing these problems using spreadsheets, simulation, and optimization methods. While consulting encompasses many specific tasks and requires broad functional knowledge, there is an increased need and appreciation of the usefulness of analytical consulting.

### **5506. Managing International Development Projects**

Three credits. Prerequisite: OPIM 5270.

Application of project management knowledge, tools, and techniques to the planning, organization, and delivery of international development projects and programs. Funded by institutions (e.g., multilateral or regional development banks, United Nations associated agencies, bilateral government agencies, non-governmental organizations, global funds), these projects/programs cover a wide range of sectors and focus on poverty reduction/alleviation and improving living standards of people in developing and emerging countries, assistance to victims of natural or people caused disasters, capacity building and development of basic physical and social infrastructures, and on promoting environmentally sound development and basic human rights protection.

### **5507. Advanced Project Management Topics**

Three credits. Prerequisite: OPIM 5270 and 5668.

Uses case studies to illustrate the variety of projects and the issues involved in managing them from resource concerns to the criticality for demand estimation; from conflicting objectives of stakeholders to social responsibility issues; from knowing the customer to project finance challenges. These cases inductively teach advanced topics in the management of large projects, such as planning and scheduling issues, costing and budgeting, staffing and organizing, project finance structuring, sustainability and environmental issues, and the challenges in planning and execution of these complex projects. Agile project management methodologies for effectively and efficiently undertaking knowledge-based projects of today. Practical guidance and experience around the process of initiating, delivering, and evaluating analytics projects.

### **5601. Technical Communications in Business Analytics and Project Management**

One credit. Prerequisite: Open only to MBA and MSBAPM students, others with consent.

Reviews the foundational knowledge necessary for MSBAPM student to be a well-equipped analytics professional. Communication skills are essential to convey technical analytical content. Topics such as Public Speaking, Emotional Intelligence, Non-Verbal Communication, Requirements Gathering, and Etiquette via multiple modes of Communications (email, phone, in person, one to one, and one to group) and more will be discussed and practiced. Such skills are critical to professional success as the industry is changing to require technical depth and also the ability to connect it to the business. Topics covered include: Communication Skills - Bridging the Gap between the Technical and Business; Presentations Skills - Technical Content to the Business; Networking with Analytics Professionals.

#### **5603. Statistics in Business Analytics**

Three credits. Prerequisite: Open only to Business Analytics and Project Management M.S. students, others with consent.

Advanced level exploration of statistical techniques for data analysis. Students study the concepts of population and sample; discuss the difference between population parameters and sample statistics, and how to draw an inference from known sample statistics to usually unknown population parameters. Topics will focus on rigorous statistical estimation and testing. Prepares students with the skills needed to work with data using analytics software.

#### **5604. Predictive Modeling**

Three credits. Prerequisite: Open only to MBA and MSBAPM students, others with consent. Corequisite: OPIM 5603

Introduces the techniques of predictive modeling in a data-rich business environment. Covers the process of formulating business objectives, data selection, preparation, and partition to successfully design, build, evaluate and implement predictive models for a variety of practical business applications. Predictive models such as neural networks, decision trees, Bayesian classification, and others will be studied. The course emphasizes the relationship of each step to a company's specific business needs, goals and objectives. The focus on the business goal highlights how the process is both powerful and practical.

#### **5620. Managing and Controlling Information Systems**

Three credits. Prerequisite: OPIM 5165 or 5182; open only to MBA and MSBAPM students, others with consent.

Examines the management control problems and systems development processes from the dual perspective of managers of the computer information system, and the organization as a whole, including persons who interact extensively with the systems personnel or are administratively in a position to influence the information system.

#### **5641. Business Decision Modeling**

Three credits. Prerequisite: Open only to MBA and MSBAPM students, others with consent.

Discusses business modeling and decision analysis. Covers topics such as optimization, simulation, and sensitivity analysis to model and solve complex business problems. As spreadsheets are often used as software tools for such problem solving, the course will emphasize developing high

quality spreadsheets to ensure that the objectives of the model are clear, defining the calculations, good design practices, testing and presenting the results.

#### **5668. Project Risk and Cost Management**

Three credits. Prerequisite: OPIM 5270; open only to MBA and MSBAPM students, others with consent.

Introduces the art and science of project risk as well as continuity management and cost management. Risk management ensures a project is completed through both general and severe business disruptions on local, national and international levels. Managing the risk of a project as it relates to a three-part systematic process of identifying, analyzing, and responding is examined through actual case studies. In addition, this course will examine the process of cost management, early cost estimation, detailed cost estimation, cost control using the earned value method, issues related to project procurement management, and the different types of contracts for various scope scenarios.

#### **5671. Data Mining and Business Intelligence**

Three credits. Prerequisite: OPIM 5604; open only to MBA and MSBAPM students, others with consent.

Discusses data mining techniques that can be utilized to effectively sift through large volumes of operational data and extract actionable information and knowledge (meaningful patterns, trends, and anomalies) to help optimize businesses and significantly improve bottom lines. The course is practically oriented with a focus of applying various data analytical techniques in various business domains such as customer profiling and segmentation, database marketing, credit rating, fraud detection, click-stream Web mining, and component failure predictions.

#### **5770. Advanced Business Analytics and Project Management**

Three credits. Prerequisite: OPIM 5604 and 5272 and 5671 and 5668; open only to MSBAPM and MBA students.

Capstone course involving a live data analytics project, where students will need to integrate their knowledge of data analytics and project management. Using the skill sets of predictive modeling, data management, process models, and data mining techniques, students will investigate a real problem through data analytics, and will use their project management skills to complete the project within time and budget constraints.

#### **5771. Enterprise Security, Governance and Audit**

Three credits. Prerequisite: Open only to MSBAPM and MBA students, others with consent.

Discusses the business risks arising from digital information processing and identifies ways to prevent, detect, and mitigate negative consequences of information security breaches. First, students will be introduced to the basic principles of information security, its role in reducing information risk exposure, and tools and solutions that can be used to prevent information loss or costly business interruptions. Second, students will explore the role of information technology governance in business organizations, discuss important relevant laws (for example, Sarbanes-Oxley Act of 2002), reporting requirements, and industry standards

for IT Governance (for example, COBIT). Third, students will study the process of information systems audit, IT audit tools, and audit procedures to help in detection and prevention of fraud.

#### **5894. Seminar**

Variable (1-6) credits. May be repeated for credit.

Introduces many of the most exciting concepts emerging in the field of consumer oriented Internet working, including high-speed access [cable modem, satellites and digital subscriber lines (DSL)] and infrastructure developments such as gigabyte networking with asynchronous transfer mode (ATM). Evaluates the emerging directions in EC that are expected to shape both consumer and business applications in the coming decade. A "macro perspective" is used to examine the technical and managerial aspects of electronic commerce. Focus is on questions such as: What are or will be the key attributes of current and future digital products, payment systems, online retailing, and banking? How are these systems designed and implemented? What are the different mercantile processes and tradeoffs associated with these processes? What impact has global connectivity made on traditional supply-chain(s)?

#### **5895. Special Topics in Information Management**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Faculty-student interaction on a one-to-one basis involving independent study of specific areas of operations management, operations research and/or information management. Emphasis, selected by the student, may be on theoretical or applied aspects. A written report is required.

#### **6200. Investigation of Special Topics**

Variable (1-6) credits. Prerequisite: Open only to doctoral students; instructor consent. May be repeated for a maximum of nine credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

In-depth investigation in special topics in Operations and Information Management.

#### **6201. Research Methods for Operations and Information Management**

Three credits. May be repeated for a total of 12 credits.

Several advanced analytical methods that are relevant to students' areas of research will be studied in depth in this seminar. Topics may include special mathematical programming; complex decision making; linear models; advanced statistical analysis; and stochastic processes.

#### **6202. Seminar in Operations Management**

Three credits. May be repeated for a total of 12 credits.

Introduces doctoral students to the current research concerns in the field of Operations Management. Acquaint students with the variety of research tools used in the field, enabling them to critically evaluate the research of other scholars in the field as well as to develop research skills in identifying potential research problems to be analyzed.

#### **6203. Seminar in Management Information Systems**

Three credits. May be repeated for a total of 12 credits.

A topic on a significant applied or theoretical aspect of information systems will be chosen. Broadly, these aspects will encompass modeling, design, implementation, testing, and operation of computer information systems, and the implications of information technologies for the organization.

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## Pathobiology and Veterinary Science (PVS)

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### 5094. Pathobiology Seminar

One credit. Prerequisite: Instructor consent. May be repeated for a total of 10 credits.

### 5099. Research and Independent Study in Animal Diseases

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

### 5201. Microbiology of Atypical Bacteria

Two credits.

An in-depth presentation of current information on medically significant atypical bacteria, with emphasis on molecular aspects of pathogenesis.

### 5202. Viral Pathogenesis

Three credits. Prerequisite: A course in virology or microbiology and one in biochemistry with instructor consent. Recommended preparation: a course in immunology or pathology.

Review and discussion of recent advances regarding mechanisms involved in the development of viral disease at the virus, host, organ, tissue, cell, sub-cellular and molecular levels. Current advances in virus-host interactions will be discussed, including virulence factors, mechanisms of suppression and evasion of host responses, oncogenesis, persistence, immunopathology, neurotropism, neuroinvasion.

### 5203. Principles of Antibacterial Development

Three credits. Prerequisite: A course in general microbiology or bacteriology with instructor consent.

Important concepts and pioneering strategies currently being used to develop novel antibacterials.

### 5300. Disc of Pathobiology and Veterinary Science Literature

One credit. Prerequisite: Instructor consent. May be repeated for a total of three credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Weekly discussion of current peer-reviewed literature related to pathobiological basis of disease.

### 5303. Veterinary Pathology Lecture Series

Variable (1-3) credits. May be repeated for a total of nine credits.

Lectures on veterinary and comparative anatomic pathology organized by animal species or disease classification utilizing lectures on electronic media in the context of a prescribed plan of study. May be repeated for credit with change in content

### 5392. Practicum in Veterinary Anatomic Pathology

Three credits. Prerequisite: Open only to veterinarians accepted into the residency program in veterinary pathology; instructor consent. May be repeated for credit. Students taking this course will

be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Service-based learning of veterinary anatomic pathology through gross and histologic evaluation of necropsy and biopsy case material by direct review with faculty pathologists.

### 5394. Veterinary Pathology Seminar

Two credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Blinded examination of gross and histologic lesions with emphasis on lesion recognition, description and disease diagnosis, followed by group discussion of each case.

### 5401. Immunobiology

Four credits. Prerequisite: Open with consent of instructor to graduate students, upper-level Honors students, and senior undergraduate students with recommended preparation. Recommended preparation: Previous coursework in biochemistry, genetics, cell biology, and microbiology.

Principles of basic and clinical immunobiology; phylogeny and ontogeny of the immune response, characteristics of the immune response, cellular and humoral immunity; central and peripheral lymphoid tissues; mechanisms of immunologic injury and immunologic diseases; comparative and veterinary immunology; transplantation and tumor immunology.

### 5431. Avian Pathology

Two credits. Prerequisite: Instructor consent.

A comprehensive study of systemic avian pathology, stressing the correlation of pathological changes with clinical and microbiological findings.

### 5503. Molecular Approaches to Disease Diagnosis and Prevention

Two credits. Prerequisite: Instructor consent.

Molecular aspects of disease, with emphasis on methodologies and strategies for diagnosis, analysis and prophylaxis.

### 5594. Current Veterinary Pathology Literature

One credit. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Detailed study of current veterinary pathology literature, with particular emphasis on lesions and mechanisms of disease.

### 5632. Vaccines: Mechanisms of Immune Protection

(Also offered as AH 5632.) Three credits. Prerequisite: Instructor consent.

Focuses on several different approaches to inducing prophylactic immunity in the host. Both traditional and modern molecular approaches to vaccine design are discussed. In addition, the mechanisms employed by pathogenic microbes to avoid hosts' immune responses will be examined in the context of vaccine design. The students will gain an appreciation for the transition from basic research to practical applications.

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## Pharmacy (PHAR)

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### 5215. Pharmaceutical Biotechnology

Three credits. Prerequisite: Instructor consent.

A survey of medicinal chemistry and pharmaceuticals of pharmaceutical products derived from modern methods of molecular biology. Considers products in use or in clinical trials

to emphasize the conceptual basis, design, and synthesis of biotech products in the context of current practical applications.

### 5216. Dosage Forms I

Three credits.

Introduces the student to the principles of thermodynamics, ionic equilibrium, chemical kinetics and diffusion. Application of these principles to formulation, stability and dissolution of a drug product, and release from the dosage form for optimum therapeutic outcome. Required of entering graduate students in Pharmaceutics who do not have a Pharmacy background as well as those who do not pass the qualifying examination within the first year of the program.

### 5217. Dosage Forms II

Three credits.

Covers the basic principles of the surface and colloid chemistry and rheology, as these relate to the performance of dispersed system dosage forms including colloids, suspensions, emulsions, suppositories, aerosols, ointments, and transdermals. Required of entering graduate students in Pharmaceutics who do not have a Pharmacy background, and those who do not pass the qualifying examination within the first year of the program.

### 5219. Biopharmaceutics and Pharmacokinetics

Three credits.

Basic principles of biopharmaceutics, bioavailability, and pharmacokinetics, including their application to the rational design of both dosage forms and maximally effective dosing regimens. Intended for graduate students who may not have sufficient previous exposure to biopharmaceutics and pharmacokinetics.

### 5239. Current Literature in Pharmaceutics

One credit. May be repeated for a total of three credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Designed to familiarize students with current pharmaceutics literature and to educate students in critical peer review in the pharmaceutics literature.

### 5240. Drug Discovery and Development

Two credits. Prerequisite: Instructor consent.

The processes of new drug development; target identification, drug discovery process, drug candidate evaluation, preclinical toxicity assessment, drug formulation and delivery, clinical trials for safety and efficacy, and FDA regulation on new drug application.

### 5293. Seminar in Pharmaceutics

One credit. May be repeated for a total of two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Reports and discussions.

### 5295. Special Problems in Pharmaceutics

Variable (1-4) credits. Prerequisite: Instructor consent.

Individualized for students desiring research experience in any of the areas of pharmacy other than the area chosen by the student for thesis research.

**5297. Special Topics in Pharmaceutics**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Includes topics not presently covered in courses which are pertinent to current departmental research and areas of recent development in the literature.

**5301. Macromolecules in Drug Design**

Two credits. Prerequisite: Instructor consent.

A cooperative presentation of the fundamentals of medicinal chemistry.

**5302. Chemical Biology and Drug Design**

Two credits.

Introduction to the emerging field of chemical biology with a particular focus on the role it plays in understanding cellular signaling, drug design, and drug development.

**5303. Small Molecule Structure and Function**

Two credits.

Small organic molecules continue to be the preeminent form of therapeutic agents. The small molecules that constitute clinically used agents are developed through a highly interdisciplinary process involving chemists, biologists and healthcare workers in a process commonly referred to as drug discovery. The purpose of this course is to provide the student with a broad view of drug properties, drug function and the drug discovery process.

**5308. Structure and Function of Biological Membranes**

Three credits.

Overview of cell membrane structure and function based on a foundation of physical and biochemistry principles. Topics include lipid bilayers, vesicles and liposomes, cholesterol, membrane protein structure and function, transport, membrane fusion, receptors, drug/membrane interactions and membranes in cell regulation.

**5393. Seminar in Medicinal Chemistry**

One credit. May be repeated for a total of 10 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Reports and discussions.

**5395. Special Problems in Medicinal Chemistry**

Variable (1-4) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Individualized course for students desiring research experience in any of the areas of medicinal chemistry other than the area chosen by the student for thesis research.

**5397. Special Topics in Medicinal Chemistry**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Current developments in Medicinal Chemistry. For students who need exposure to topics not covered in other department offerings.

**5403. Current Literature in Pharmaceutical Sciences**

One credit. May be repeated for a total of two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Designed to familiarize students with current pharmaceutical sciences literature and to educate students in critical peer review of this literature.

**5454. Principles of Safety Evaluation**

One credit.

Introduction to toxicologic risk assessment. Fundamentals of dose-response relationships and risk characterization, and their application in the establishment of permissible exposure limits for drugs and other chemicals in the environment or workplace.

**5471. Advanced Pharmacology I: Basic Principles**

Three credits. Prerequisite: Instructor consent.

Molecular mechanisms of drug action including occupation and rate theories. Characterization of receptors in-situ and in-vitro.

**5472. Advanced Pharmacology II: Drug Disposition**

Two credits.

Drug absorption, distribution, excretion, metabolism, interaction, allergy, resistance, tolerance, idiosyncrasy and toxicity.

**5475. Toxicology Scholars Colloquium**

One credit. May be repeated for a total of five credits.

Reviews, discussions and seminars focused on the research of scientists who have made significant contributions to the science of toxicology.

**5493. Seminar in Pharmacology and Toxicology**

One credit. May be repeated for a total of two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Reports and discussions on journal and review articles and presentation of personal research results.

**5494. Seminar in Immunology**

One credit. May be repeated for a total of two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Reports and discussions.

**5495. Special Problems in Pharmacology I**

Variable (1-4) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Individualized for students desiring research experience in any of the areas of pharmacology.

**5496. Special Problems in Toxicology**

Variable (1-4) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Individualized course for students desiring research experience in any of the areas of toxicology.

**5497. Special Topics in Pharmacology**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Includes topics not presently covered in courses, which are pertinent to current departmental research and areas of recent development in the literature.

**5498. Special Topics in Toxicology**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Basic principles of toxicology as emphasized by recent developments in the biochemical toxicology literature.

**5746. Introduction to Managed Care Pharmacy**

Three credits. Prerequisite: Instructor consent.

A study of managed care pharmacy within the United States health care system, with emphasis on managed care organization and control, pharmacy benefits design and management, outcomes measurement, pharmacoeconomics, health care provider and client education, benefits plan financing and marketing, and legal issues of managed care pharmacy.

**5764. Advanced Pharmacy Administration**

Three credits. Prerequisite: Instructor consent.

A study of modern management techniques applicable in terminal drug distribution. Special emphasis is placed upon quantitative methods and the utilization of electronic data processing.

**5797. Special Topics in Pharmacy Administration**

Prerequisite: Instructor consent.

Current developments in Pharmacy Administration. A course for students needing exposure to topics not covered in other Department of Pharmacy Practice offerings.

**6234. Advanced Biopharmaceutics**

Three credits.

Overview of physico-chemical, biopharmaceutic, and physiologic factors controlling the delivery of drug and their sites of action.

**6241. Advanced Kinetics and Mechanisms of Drug Degradation**

Two credits. Prerequisite: PHAR 6288; instructor consent required.

An advanced treatment of the physical organic chemistry critical to the characterization and understanding of stability in pharmaceutical products.

**6242. Freeze Drying of Pharmaceuticals**

Two credits. Prerequisite: Instructor consent.

The science and technology of freeze drying, including fundamentals of heat and mass transfer gas systems, process design considerations, and formulation strategies with emphasis on stabilization of therapeutic proteins.

**6285. Complex Equilibria**

Three credits.

A study of the physico-chemical and mathematical treatment in pharmaceutical systems. Topics center on thermodynamics, activity coefficients, acids and bases, solubility, complexation solubilization and protein binding.

**6286. Transport Processes**

Three credits. Prerequisite: Instructor consent.

Emphasis is on the application of the laws of diffusion to dissolution, membrane transport and release of drugs from dosage forms.

**6288. Kinetics and Mechanisms of Drug Degradation and Stability**

Three credits. Prerequisite: Instructor consent.

A study of the kinetics and mechanisms of drug degradation in the solid and liquid states and drug stabilization.

**6289. Pharmacokinetics**

Three credits. Prerequisite: Instructor consent.

A discussion of absorption, distribution, and clearance mechanisms, and their impact on concentration-time profiles and drug response.

**6290. Colloid Chemistry and Interfacial Phenomena**

Three credits. Prerequisite: Instructor consent.  
Interfacial phenomena, colloid chemistry.

**6452. Toxicology of the Respiratory System**

Two credits. Prerequisite: PHAR 6455; instructor consent.

Anatomic and functional aspects of toxic injury to the respiratory tract with an emphasis on biochemical and physiologic mechanisms of toxic pulmonary injury. Lectures and student presentations.

**6455. Advanced Toxicology**

Four credits.

A study of the harmful effects of toxic chemicals on biological systems. Emphasis is on mechanisms of toxicant action and on practical applications of modern techniques to assess toxicity and hazard.

**6459. Immunotoxicology**

Two credits. Prerequisite: Instructor consent.

Demonstrates the detrimental effects on the immune system and/or inflammatory response, by a variety of physical and chemical xenobiotics. Emphasis is placed on the mechanisms of chemical and drug-induced immunosuppression, autoimmune response, and allergic response.

**6475. Mechanistic Toxicology I**

Two credits. Prerequisite: Departmental consent.

Mechanistic toxicology describes the processes of how chemicals exert their toxic effects in biological systems. Therefore, understanding of the underlying mechanisms of toxicity, together with exposure estimates, provides key information that links the toxic hazard of a chemical with the actual human health risk. This first course explores some fundamental cellular and molecular mechanisms of toxicity and integrates them into a larger picture; reactive intermediates, oxidative and nitrate stress, and mitochondria-mediated toxicity will be covered. The basic concepts will be illustrated with specific examples (drugs and environmental chemicals).

**6484. Cutaneous Differentiation: Molecular Mechanisms and Cellular Processes**

Two credits. Prerequisite: Instructor consent.

Examines mammalian skin structure, keratinocyte, immune and pigment cells, mechanisms of mesenchymal-epithelial induction, replication- and cytoskeletal-based diseases, stem cell identification and plasticity, and transcriptional regulation of differentiation-dependent gene expression.

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## Philosophy (PHIL)

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**5300. Independent Study for Graduate Students**

Variable (1-6) credits. Prerequisite: Open only to Philosophy graduate students. May be repeated for credit.

**5301. Seminar in Contemporary Philosophy**

Three credits. Prerequisite: Open only to Philosophy graduate students.

An introduction to contemporary philosophers such as Russell, Carnap, Ayer, Quine, Putnam, and Kripke.

**5302. Introduction to Moral Philosophy**

Three credits. Prerequisite: Open only to Philosophy graduate students.

Introduction to ethical theory. Readings in historical and contemporary moral philosophy.

**5305. Seminar in Aesthetics**

Three credits. Prerequisite: Open only to Philosophy graduate students.

A consideration of some of the basic problems in aesthetics.

**5307. Logic**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated for a maximum of nine credits.

**5312. Seminar in the Philosophy of Science**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated once for credit.

A discussion of selected current, methodological issues in the philosophy of science. Topics may include scientific realism versus nonrealism; theories of scientific explanation; the nature of scientific revolutions; theories of the lawfulness of nature; and feminist theories of science.

**5314. Action Theory**

Three credits. Prerequisite: Open only to Philosophy graduate students.

Examination and analysis of the concept of "action" and related concepts such as "agent" and "intention."

**5315. Seminar in Moral Philosophy**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated once for credit.

A discussion and analysis of significant problems in ethical theory.

**5316. Seminar in the Philosophy of Social Science**

Three credits. Prerequisite: Open only to Philosophy graduate students.

**5320. Seminar in the History of Philosophy**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated for a maximum of nine credits.

**5327. Seminar on Kant**

Three credits. Prerequisite: Open only to Philosophy graduate students.

**5330. Seminar on Theory of Knowledge**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated for a maximum of 12 credits.

Problems in the foundations and nature of knowledge. A critical study of recent treatments of the problem of mind. Issues such as the mind-body problem, our knowledge of the existence of other minds, the existence of private languages, will be dealt with in detail.

**5331. Seminar in Philosophy of Mind**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated once for credit.

A critical study of recent treatments of the problem of mind. Issues such as the mind-body problem, our knowledge of the existence of other

minds, the existence of private languages, will be dealt with in detail.

**5340. Seminar on Metaphysics**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated for a maximum of nine credits.

**5342. Seminar in Philosophy of Language**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated once for credit.

**5344. Seminar in Philosophical Logic**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated for a maximum of nine credits.

Topics in the philosophies of logic and mathematics. May include completeness results for non-classical logics, higher-order languages and logics, diagonalization, limitative theorems (Tarski, Godel), paradoxes, and formal theories of truth.

**5350. Seminar in Recent Social and Political Philosophy**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated once for credit.

**5360. Seminar in Recent Continental Analytic Philosophy**

Three credits. Prerequisite: Open only to Philosophy graduate students.

Critical reading of selected texts of recent European philosophers such as Derrida, Irigaray, Kristeva, Heidegger, and Foucault; along with related work of analytic philosophers such as Davidson, Quine, Rorty, and Kripke.

**5397. Seminar**

Three credits. Prerequisite: Open only to Philosophy graduate students. May be repeated for credit.

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## Physical Therapy (PT)

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**5410. Human Anatomy Trunk and Upper Extremity**

Four credits. Prerequisite: Department consent.

Discussion of the conceptual and structural basis of osteology, myology, neurology, human development, and basic kinesiology and biomechanics. Selected anatomical and physiological dysfunctions of the trunk and upper extremity will also be discussed.

**5412. Human Anatomy Pelvis and Lower Extremity**

Four credits. Prerequisite: Department consent.

Discussion of the conceptual and structural bases of osteology, myology, neurology, human development, and basic kinesiology and biomechanics. Selected anatomical and physiological dysfunctions of the pelvis and lower extremity will also be discussed.

**5414. Clinical Human Physiology**

Three credits. Prerequisite: Department consent.

Discussion of the biochemical, nutritional, cellular and physiological principles necessary for the analysis of the normal and abnormal function and for the rehabilitation of the human

musculoskeletal, cardiovascular and respiratory systems using patient cases.

#### **5416. Clinical Neuroscience**

Five credits. Prerequisite: Department consent.

Introduction to foundational concepts and vocabulary of neuroanatomy, neurophysiology, and the basic mechanisms of neuropathology, with emphasis on the specific pathologies they are likely to encounter in physical therapist practice. The course will provide an overview of the medical and surgical diagnosis and management of patients with neurologic pathology. Impact of neuromuscular pathology across the lifespan and implications for physical therapy management are introduced.

#### **5418. Clinical Pharmacology**

Three credits. Prerequisite: Department consent.

Integrates and summarizes the essentials of medical pharmacology. The main molecular and cellular actions of drugs will be emphasized as well as the principles governing the use and actions of drugs in the treatment of disease.

#### **5420. Foundation in Clinical Pathology**

Three credits. Prerequisite: Department consent.

A comprehensive presentation of the general principles of disease with an emphasis on general pathology. Focus is on the mechanisms underlying disease and their management as a basis for therapeutic program planning in physical therapy.

#### **5422. Cardiopulmonary Pathology**

Two credits. Prerequisite: Department consent.

A comprehensive presentation of cardiopulmonary diseases. Focus is on the mechanisms underlying disease and their management as a basis for therapeutic program planning in physical therapy.

#### **5424. Musculoskeletal Pathology**

Four credits. Prerequisite: Department consent.

Mechanical properties of musculoskeletal tissues will be described. Growth and maintenance mechanisms of the different tissues will be detailed. Diseases and disorders of the musculoskeletal system will be covered. The underlying tissue pathology and clinical symptoms will be addressed from the orthopedic and physical therapy perspective. Therapeutic interventions will be presented.

#### **5430. Functional-Biomechanical Relationships**

Three credits. Prerequisite: Department consent.

Students will receive detailed descriptions and analyses of structures of the musculoskeletal system in general as well as within individual functional regions. Students will also examine how structure affects function within each region. Lastly, they will also examine the forces sustained by the various regions during function, in normal and pathological conditions thus preparing them to apply knowledge of normal anatomical structure and function to therapeutic intervention.

#### **5431. Prevention, Health Promotion, Fitness and Wellness**

Two credits. Prerequisite: Department consent.

Prepares the student to provide culturally competent evidence based physical therapy services for prevention, health promotion, fitness and wellness to individuals, groups, and communities.

#### **5432. Motor Control and its Clinical Application**

Four credits. Prerequisite: Department consent.

Introduction to and discussion of contemporary theories of motor control, research evidence on normal, abnormal, developmental, and aging-related processes governing motor control will be provided. These ideas will be applied to understand the various impairments of neurological populations and their treatment using the model of evidence based practice.

#### **5433. Management for the Physical Therapist**

Three credits. Prerequisite: Department consent.

Introduction to the student to the field of disability studies. Physical, cognitive, emotional, social, and cultural factors related to the presence of disability and chronic illness throughout the life span will be explored. Emphasis is placed on those aspects of disability that affect the practice of physical therapy assessment and treatment.

#### **5434. Foundations for System Review**

Two credits. Prerequisite: Department consent.

A foundations course for Physical Therapy Majors in Differential Diagnosis. The course scope covers a broad spectrum of clinical sciences and provides training in screening (i.e. history taking) of a culturally diverse patient/client population across the lifespan for appropriate healthcare management.

#### **5437. Education and Communication for Physical Therapists**

Three credits. Prerequisite: Department consent.

Fundamental aspects of education and communication as they relate to physical therapy as described in the Guide to Physical Therapist Introduction to learning theories and theories of change. Learner assessment and strategies for communication and instruction will be covered. Students generate written and oral communications and will plan and deliver an educational unit relating to physical therapy.

#### **5438. Professionalism for the Physical Therapist**

Two credits. Prerequisite: Department consent.

Through readings, lecture, personal investigation, and discussion of current issues, "hot topics" and problems in the profession of physical therapy, students will demonstrate an understanding of their environment of practice. Students learn selected laws, rules, regulations, guidelines and ethical codes governing the practice of physical therapy and will explore possible solutions to common professional problems. Emphasis is placed on the importance of ethical and legal practice.

#### **5440. Evidence-Based Practice in Physical Therapy**

Three credits. Prerequisite: Department consent.

A foundations course in research, statistical analyses, and evidence-based clinical-decision for Physical Therapy students. Students will develop skills for conducting literature searches, critically appraising clinical research and developing research questions. Applications will fall within the Physical Therapy Profession Patient/Client Management Model.

#### **5446. Evidence-Based Practice Seminar**

Two credits. Prerequisite: Department consent.

Focuses on clinical research related to diagnosis, and prevention / treatment outcomes with emphasis on musculoskeletal and neuromuscular physical therapy. Students will participate in meetings and discussions to facilitate their research projects.

#### **5448. Capstone Scholarly Report Preparation**

Two credits. Prerequisite: Department consent.

Students in the Doctor of Physical Therapy program are required to participate in a scholarly project (original research, systematic review or clinical case report) with one or more faculty mentors and students. Course requirements are met by the preparation of a manuscript meeting professional standards for form and content, culminating in a document appropriate for submission to a refereed journal.

#### **5450. Fundamentals of Physical Therapy Examination**

Five credits. Prerequisite: Department consent.

Covers the fundamentals of physical therapist examination in the context of overall practice as described in the Guide to Physical Therapist Practice. Students will be introduced to basic tests and measures as well as to information relevant to their selection and interpretation. Students will apply the tests in laboratory and clinical settings and will learn to appropriately document their findings.

#### **5451. Acute Care Management**

Five credits. Prerequisite: Department consent.

An exploration of the practice of Physical Therapists in the acute care setting. Students will develop competency in clinical evaluation of impairments and functional limitations, identification of appropriate intervention options, and implementation of a plan of care to improve performance of functional activities for patients commonly encountered in acute care practice settings. This course encourages problem solving and critical thinking through the integration of knowledge and skills in the laboratory and clinic and through a written assignment and presentation.

#### **5452. Therapeutic Interventions I**

Two credits. Prerequisite: Department consent.

An exploration of interventions commonly used by physical therapists in both inpatient and outpatient settings. Students will develop competency in selection and implementation of therapeutic exercise as an intervention to improve performance of functional activities for patients commonly encountered in a variety of settings. Assessment of therapeutic effects and modification of the interventions is an integral component.

#### **5453. Musculoskeletal Rehabilitation - The Spine**

Three credits. Prerequisite: Department consent.

Management of musculoskeletal conditions affecting the spine. Elements of patient management consist of examination, evaluation, diagnosis, prognosis, and intervention with attention to outcomes, differential diagnosis, and screening strategies. Evidence-based practice is reinforced. Applications will consider client populations across the life span.

#### **5454. Musculoskeletal Rehabilitation - The Extremities**

Three credits. Prerequisite: Department consent.

Management of musculoskeletal conditions affecting the extremities. Elements of patient management consist of examination, evaluation, diagnosis, prognosis, and intervention with attention to outcomes, differential diagnosis, and screening strategies. Evidence-based practice is reinforced. Applications will consider client populations across the life span.

#### **5455. Essentials of Rehabilitation Practice**

Three credits. Prerequisite: Department consent.

An exploration of the practice of Physical Therapists in the area of orthotics prosthetics, Diabetes and Spinal Cord Injury. Students will develop competency in clinical assessment of functional limitations, specifically in locomotion, identification of appropriate treatment options and implementation of interventions, through the use of orthotics and prosthetics, to improve performance of functional activities for patients with a variety of deficits.

#### **5456. Neuromuscular Rehabilitation**

Four credits. Prerequisite: Department consent.

Through comprehensive problem solving, students will learn to manage adult patients with neuromuscular dysfunction. Students will develop neurophysiologically sound examination and intervention skills integrating physical and psychological patient considerations. The skill set for examination and treatment will be consistent with foundational movement science under the evidenced based practice model.

#### **5458. Pediatric Physical Therapy**

Two credits. Prerequisite: Department consent.

Covers normal motor development, childhood conditions that are commonly served by pediatric physical therapists, and general examination and intervention methods used for pediatric populations.

#### **5460. Introduction to Clinical Education**

One credit. Prerequisite: Department consent.

Provides students with a foundation for clinical experiences and provide simulated hands-on practice in doing tests and measures used in physical therapy and in nursing. Concepts of expert practice, experiential learning, collaborative learning are explored. Interprofessional learning will be emphasized through work with nursing students. Students will develop an understanding of the importance of experiential learning, professional behaviors, self-evaluation and personal reflection. Students will work collaboratively with nursing students in a simulation lab while developing an understanding of interprofessional patient care.

#### **5461. Clinical Education I**

Eight credits. Prerequisite: Students must be in good academic standing and be granted department consent.. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Under close supervision by a licensed Physical Therapist, students will participate as a member of the health care team to provide patient care in an inpatient or outpatient setting for 10 weeks. Patient care settings may include but are not limited to Acute Care, Orthopedics, Neuro-Rehabilitation or specialties including but not limited to pediatrics, oncology, or women's health. The course is held off campus at individually assigned clinical facilities throughout the country. Each student is assigned

one or two clinical instructors who are physically present and immediately available for direction and supervision.

#### **5462. Integrated Clinical Experience, Musculoskeletal I**

One credit. Prerequisite: Department consent.

Clinical experience that provides students the opportunity to integrate interventions learned in PT 5452 in an outpatient setting. Students will develop and administer plans of care that include therapeutic exercise and physical agents for outpatients with various musculoskeletal conditions.

#### **5463. Integrated Clinical Experience, Musculoskeletal II**

Two credits. Prerequisite: Department consent.

Clinical experience that provides students the opportunity to integrate interventions learned in PT 5453 and PT 5454 in an outpatient setting. Students will utilize examination and manual therapy skills in the development and implementation of plans of care for outpatients with various musculoskeletal conditions.

#### **5464. Clinical Education II**

Eight credits. Prerequisite: Students must be in good academic standing and be granted department consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Under close supervision by a licensed Physical Therapist, students will participate as a member of the health care team to provide patient care in an inpatient or outpatient setting for 10 weeks. Patient care settings may include but are not limited to Acute Care, Orthopedics, Neuro-Rehabilitation or specialties including but not limited to pediatrics, oncology, or women's health. The course is held off campus at individually assigned clinical facilities throughout the country. Each student is assigned one or two clinical instructors who are physically present and immediately available for direction and supervision.

#### **5465. Public Engagement in Prevention, Health Promotion, Fitness and Wellness**

One credit. Prerequisite: Department consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Provides experiences for students in the development and delivery of service related to prevention, health promotion, fitness, and wellness in settings that support supervised interaction with the surrounding community.

#### **5466. Integrated Clinical Experience, Neuromuscular**

Two credits. Prerequisite: Department consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

A clinical experience that provides students the opportunity to integrate interventions learned in PT 5455 and PT 5456 in a clinical setting. Students will utilize examination and intervention skills in the development and implementation of plans of care for patients with various neuromuscular conditions.

#### **5467. Clinical Education III**

Eight credits. Prerequisite: Students must be in good academic standing and be granted department consent. Students taking this course will be

assigned a final grade of S (satisfactory) or U (unsatisfactory).

Under close supervision by a licensed Physical Therapist, students will participate as a member of the health care team to provide patient care in an inpatient or outpatient setting for 12 weeks. Patient care settings may include but are not limited to Acute Care, Orthopedics, Neuro-Rehabilitation or specialties including but not limited to pediatrics, oncology, or women's health. The course is held off campus at individually assigned clinical facilities throughout the country. Each student is assigned one or two clinical instructors who are physically present and immediately available for direction and supervision.

#### **5469. Integrated Clinical Experience, Acute Care**

One credit. Prerequisite: Students must be in good academic standing and be granted department consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Provides students with clinical experience at hospitals and sub-acute health care facilities. Students will observe and will assist as appropriate with patient care under the supervision and direction of a licensed physical therapist. The course allows students to integrate and apply the didactic component of the curriculum in an acute or sub-acute environment. It is designed to foster the student's appreciation for the multidisciplinary nature of hospital care.

#### **5471. Manual Therapy in the Management of Musculoskeletal Disorders**

Three credits.

Focuses on the manual therapy examination and treatment of patients with musculoskeletal conditions. Instruction will be primarily case based and integrate various manual therapy approaches across body regions. Concepts introduced in the PT 5453 and 5454 courses will be explored in greater depth with a focus on improved proficiency in delivery of soft tissue and joint manipulation techniques including thrust. Evidence-based practice will be reinforced. Applications will consider diverse patient/client populations across the life span.

#### **5472. Advanced Pediatric Physical Therapy**

Three credits. Prerequisite: Department consent.

An elective for Doctorate of Physical Therapy students that covers the specialized practice of pediatric physical therapy. The course provides in depth information about pediatric conditions for which physical therapy services are typically provided. Specialized pediatric assessments and interventions are reviewed and clinical opportunities are provided to integrate and apply the academic information.

#### **5480. Interaction for Health Care and Society**

Three credits. Prerequisite: open only to students in the D.P.T. program, others with consent.

Introduction to health care systems. Interactions between government agencies, institutions, communities and individuals addressed in relation to planning, funding, and delivering healthcare. Particular focus placed on societal issues relating to underrepresented groups including persons with disabilities (PWD), with an emphasis on those

aspects that affect the practice of physical therapy assessment and treatment.

#### 5481. Therapeutic Interventions II

Two credits. Prerequisite: PT 5452; open only to Physical Therapy students.

An exploration of interventions commonly used by physical therapists in both inpatient and outpatient settings. Students will develop competency in selection and implementation of therapeutic exercise and physical agents as interventions to improve performance of functional activities for patients commonly encountered in a variety of settings. The assessment of therapeutic effects and modification of the interventions is an integral component of this course.

### Physics (PHYS)

#### 5010. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated with a change of topic up to three times for a total of nine credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

A special reading course.

#### 5020. Research in Physics

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated with a change of topic up to three times for a total of nine credits.

Experimental and theoretical research in selected topics in physics.

#### 5050. Modern Physics for Teachers

Three credits.

New teaching materials and techniques as developed by the Physical Science Study Committee for secondary school teachers of physics.

#### 5094. Physics Seminar

One credit. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The treatment of special topics, primarily by individual readings and reports.

#### 5101. Methods of Theoretical Physics I

Three credits.

Vector and tensor analysis, curvilinear coordinates, linear algebra, functions of complex variables, differential equations, special functions, elements of Green's functions.

#### 5102. Methods of Theoretical Physics II

Three credits. Prerequisite: PHYS 5101.

Abstract vector spaces, Hilbert space, group theory. Fourier series and integral representations, Theory of Green's functions and integral equations. Complex function theory.

#### 5201. Theoretical Mechanics I

Three credits.

Classical mechanics: Lagrange equations, central force motion, rigid body motions, small oscillations, Hamilton equations, canonical transformation.

#### 5301. Electrodynamics I

Three credits. Prerequisite: PHYS 5101.

Differential formulations of electrostatics and magnetostatics, electromagnetic induction. Maxwell equations, electromagnetic waves,

application to wave guides, cavities, and dispersive media. Foundations of special relativity.

#### 5302. Electrodynamics II

Three credits. Prerequisite: PHYS 5201 and 5301.

Maxwell's equations with time dependent sources; radiation from relativistic charged particles; dynamical laws for charged particles; diffraction of electromagnetic waves.

#### 5350. Computerized Modeling in Science

Four credits. Prerequisite: Instructor consent.

Development and computer-assisted analysis of mathematical models in chemistry, physics, and engineering. Typical topics include chemical equilibrium, reaction rates, particle scattering, vibrating systems, least square analysis and quantum chemistry.

#### 5401. Quantum Mechanics I

Three credits. Prerequisite: PHYS 5101 and 5201.

Mathematical formulation and interpretation of quantum mechanics. Illustrative examples. Hydrogen atom. Dirac ket and bra vectors, matrix methods. Scattering theory.

#### 5402. Quantum Mechanics II

Three credits. Prerequisite: PHYS 5401.

Symmetry and angular momentum. Approximation methods for stationary and time-dependent problems, with applications. Relativistic theory of the electron.

#### 5403. Quantum Mechanics III

Three credits. Prerequisite: PHYS 5402.

Occupation number representation, electron gas, Hartree-Fock approximation, correlation energy, superconductivity, perturbation theory, Green's functions, Feynman diagrams.

#### 5500. Statistical Mechanics

Three credits. Prerequisite: PHYS 5401.

Ensembles, distribution function, partition function. Bose-Einstein and Fermi-Dirac distributions, fluctuations, applications to the properties of solids and liquids and to the kinetic theory of gases.

#### 5621. Advanced Topics in Physics I

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Selected topics in theoretical and experimental physics.

#### 5622. Advanced Topics in Physics II

Variable (1-3) credits. Prerequisite: PHYS 5621; instructor consent required. May be repeated for a maximum of 12 credits.

Selected topics in theoretical and experimental physics.

#### 6110. Atomic Physics

Three credits. Prerequisite: PHYS 5402.

Coupling of angular momenta. Hartree-Fock theory of many electron atoms, fine structure and hyperfine structure. Introduction to group theory.

#### 6120. Molecular Physics

Three credits. Prerequisite: PHYS 6110.

Heitler-London and molecular orbital theories for diatomic molecules, semi-empirical methods of poly-atomic molecules.

#### 6130. Quantum Optics

Three credits. Prerequisite: PHYS 5401.

Semiclassical theory of light-matter interactions. Quantum states of light. Generation, detection and interactions of nonclassical radiation.

#### 6140. Principles of Lasers

Three credits.

The physics of lasers, including optical pumping and stimulated emission, laser rate equations, optical resonators, non-linear optics, the Kerr effect and Faraday rotation. Applications to gas, crystal, glass, liquid, dye, semiconductor, chemical and ultraviolet lasers, Q-switching, mode-locking, and parametric devices.

#### 6150. Semiconductor Optical Devices

Three credits. Prerequisite: PHYS 6201.

Semiconductor based optical devices such as lasers, amplifiers, modulators, and photodetectors, and their application to optical fiber transmission systems.

#### 6201. Fundamentals of Solid State Physics I

Three credits.

Crystal structure, phonons, electronic band structure, metals, insulators and semiconductors.

#### 6211. Condensed Matter Physics I

Three credits. Prerequisite: PHYS 5402.

Crystal structure; lattice vibrations; electronic band structure of solids; transport theory; basic properties of metals, semi-conductors and insulators; magnetism; super-conductivity.

#### 6212. Condensed Matter Physics II

Three credits. Prerequisite: PHYS 6211.

Crystal structure; lattice vibrations; electronic band structure of solids; transport theory; basic properties of metals, semi-conductors and insulators; magnetism; super-conductivity.

#### 6244. The Electrical Properties of Polymers

Three credits.

Experimental and theoretical aspects of electrical phenomena in polymers: DC and AC conductivity, dielectric constant, electrical breakdown, photoconductivity, etc. Extended and localized electron wave functions; band and hopping conduction.

#### 6247. Nuclear Magnetic Resonance II

Three credits. Prerequisite: PHYS 6246.

Basic theory and experimental methods of NMR with emphasis on resonance and relaxation in metals. Brief discussion of interpretation of NMR in non-metallic solids, liquids, and gases.

#### 6264. Semiconductor Physics

Three credits. Prerequisite: PHYS 6201, and PHYS 5402, which may be taken concurrently.

Semiconductors and semiconductor devices. Band structure, phonon scattering, velocity-field relations, effects of doping and magnetic fields, optical and transport properties.

#### 6300. Astrophysics and Modern Cosmology

Three credits. Prerequisite: Instructor consent.

Basic principles of contemporary astrophysics; applications to stars, galaxies, and modern cosmology.

#### 6310. Relativity

Three credits.

Special relativity, tensor analysis, foundations of general relativity, Petrov classification of curved

spacetimes, Schwarzschild and Kerr solutions, experimental tests and recent developments.

### 6320. Nuclei and Particles

Three credits.

Properties of nuclei and particles, conserved quantities, isospin, quark model, Fermi gas model, electroweak interaction, high energy scattering.

### 6331. Nuclear Physics I

Three credits. Prerequisite: PHYS 5402.

A quantum mechanical treatment of nuclear forces and nuclear structure, including the shell and collective models, and of reaction and radiation phenomena. The second semester is reserved for a discussion of selected topics on an advanced level.

### 6332. Nuclear Physics II

Three credits. Prerequisite: PHYS 6331.

A quantum mechanical treatment of nuclear forces and nuclear structure, including the shell and collective models, and of reaction and radiation phenomena. The second semester is reserved for a discussion of selected topics on an advanced level.

### 6341. Quantum Theory of Fields I

Three credits. Prerequisite: PHYS 5403.

Local gauge invariance, Lagrangian formulation, Noether currents, spontaneous breakdown of symmetry, Higgs mechanism and superconductivity, canonical quantization, Feynman diagrams, Green's functions.

### 6342. Quantum Theory of Fields II

Three credits. Prerequisite: PHYS 6341.

Topics chosen from the following: Path integral formalism, generating functionals, renormalization, abelian and non-abelian gauge theories (QED and QCD), electroweak theory, solitons, instantons.

### 6720. Galaxies and the Interstellar Medium

Three credits. Recommended preparation: proficiency in calculus. May be taught with PHYS 4720. Not open for credit to students who have passed PHYS 4720.

Galaxy formation and evolution in the hierarchical expanding Universe. Properties of the interstellar medium, including star formation and radiative transfer; stellar populations, structure, kinematics and dynamics of galaxies.

## Physiology and Neurobiology (PNB)

### 5101. Anatomy and Physiology for Intraoperative Neuromonitoring

Four credits. Prerequisite: Instructor consent. Recommended preparation: course background in biology.

Anatomy and physiology of the nervous and musculoskeletal systems.

### 5102. Fundamentals of Intraoperative Neuromonitoring

Three credits. Prerequisite: Instructor consent.

Overview of intraoperative neuromonitoring. Basics underlying recording of signals and discussion of main neuromonitoring modalities, common surgeries employing neuromonitoring, operating room protocols and procedures.

### 5103. Applied Intraoperative Neuromonitoring

Two credits. Prerequisite: Instructor consent.

Experience working with the intraoperative neuromonitoring recording machines. Practice

writing protocols for different modalities, and use of simulator programs to observe examples of signal acquisition.

### 5104. Clinical Practicum in Intraoperative Neuromonitoring

Three credits. Prerequisite: PNB 5101, 5102, and 5103, with an average GPA of 3.0 or higher in these courses, and instructor consent. May be repeated for credit.

Direct student involvement in intraoperative neuromonitoring of various surgical procedures, observing live signals obtained in a clinical setting, interaction with patients, surgeons and operating room staff, and review of operating room protocols and procedures.

### 5105. Seminar in Intraoperative Neuromonitoring

Two credits. Prerequisite: Instructor consent.

Presentations of clinical and nonclinical subjects affecting the intraoperative neuromonitoring clinician's daily job. Topics include the sterile field; infection control; needle, electrical, radiation and fire safety; patient privacy laws (HIPAA); professional conduct and communication; and diversity in the workplace.

### 5106. Advanced Modalities in Intraoperative Neuromonitoring

Four credits. Prerequisite: Instructor consent.

Comprehensive didactic and laboratory training on advanced neuromonitoring modalities (tests) such as Phase Reversal, Motor Mapping, D-Wave, Nerve Action Potential and H-Reflex.

### 5270. Molecular Endocrinology

(Also offered as MCB 5210.) Three credits.

Molecular mechanism(s) of hormone action in vertebrates and invertebrates. Molecular and genetic characterization of hormones, receptors, and signal transduction, and hormone actions at the molecular, cellular, and organismal levels. Includes student presentations on selected papers.

### 5302. Fundamentals of Physiology

Three credits.

Introduction to integrative biology. Associations of molecules, cells and tissues and their integrated functions across all organizational levels. Application of language and basic concepts of physiology to the development of problem-solving skills.

### 5347. Electron Microscopy

Variable (1-3) credits. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Lectures and laboratory exercises on the principles and practice of biological electron microscopy.

### 5351. Projects in Electron Microscopy

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Electron microscopy as a research method in biological sciences.

### 5390. Membrane Transport in Health and Disease

Three credits.

Fundamental mechanisms by which water and small molecules are transported across biological membranes. Biophysical and biochemical analysis

of transport by diffusion, osmosis, channels, carriers and pumps in health and disease.

### 5395. Independent Study

One credit. May be repeated for a total of 12 credits.

A reading course for those wishing to pursue special work in biology.

### 5396. Investigation of Special Topics

Variable (1-3) credits. May be repeated for a total of 24 credits.

Advanced study in a field within Physiology and Neurobiology.

### 5397. Research

Variable (1-6) credits. May be repeated for credit.

Conferences and laboratory work covering selected fields of Physiology and Neurobiology.

### 5700. Sensory Physiology

Three credits.

Cellular and molecular mechanisms supporting the detection of sensory stimuli in vertebrates, invertebrates and other organisms. Detection of chemicals, touch, temperature, pain, sound, light, heat, magnetic fields, and electricity

### 6400. Seminar in Neurobiology

One credit. May be repeated for a total of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

An in-depth study of selected topics in the molecular, cellular, and central aspects of neurobiology.

### 6402. Seminar in Comparative Physiology

One credit. May be repeated for a total of 12 credits.

### 6403. Seminar in Endocrinology

One credit. May be repeated for a total of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

### 6405. Seminar in Research and Journal Presentations in Physiology and Neurobiology

One credit. May be repeated for a total of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Provides the opportunity for graduate students to present journal articles and their laboratory research in physiology and neurobiology to the department.

### 6417. Developmental Neurobiology

Three credits.

Molecular mechanisms of neurodevelopment. Neural induction, cell fate determination, neurogenesis, axon targeting, neuronal migration, synapse formation and activity-dependent synaptic remodeling.

### 6418. Integrative Neurobiology

Three credits.

Physiology of the central nervous system: information processing and central mechanisms in vertebrates and invertebrates; physiological aspects of behavior.

### 6420. Physiological Proteomics

Three credits.

Current experimental and computational techniques available to study the proteome and its role in cellular and organismal physiology

**6423. Human Reproduction**

Three credits.

The physiology of human reproduction.

**6426. Molecular and Cellular Neurobiology**

Three credits. Prerequisite: open only to Physiology and Neurobiology graduate students; open to undergraduates in their senior year who have passed PNB 3251, 3275, and one of MCB 2000, 2210, or 3010; open to non-PNB graduate students by instructor consent.

Molecular and cellular aspects of modern neurobiology including the analysis of neuronal proteins and their post-translational modifications, the dynamics of cellular substructures, and various signaling mechanisms innervate cells including synaptic transmission. Molecular and cellular biology of selected neurological disorders.

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## Plant Science (PLSC)

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**5150. Design and Analysis of Agricultural Experiments**

Four credits. Prerequisite: Instructor consent. Recommended preparation: introductory college-level statistics.

Design and analysis of experiments commonly conducted in agricultural field, greenhouse, and laboratory research. Emphasis on replicated treatment experiments based on completely random, randomized block, Latin square, split-plot, and split-block designs. Limited coverage of non-replicated treatment observational-type experiments. Statistical analyses performed primarily in SAS (Statistical Analysis System) software. Presentation of summarized data using computer generated graphics from various software packages.

**5210. Molecular Laboratory Technology**

Three credits. Prerequisite: Instructor consent. Not open for credit to students who have passed PLSC 3210.

Laboratory technologies for identification and characterization of molecules important for molecular biology research, genetic manipulation and disease diagnosis. Labs will provide hands-on experience performing basic molecular biology techniques, lectures will cover theoretical basis and application.

**5240. Plant Biotechnology**

Three credits.

Principles of recombinant DNA and plant gene transfer technologies. Applications of plant biotechnology in agriculture, horticulture, forestry, human/animal health care, and the pharmaceutical industry. Social and environmental impacts of plant biotechnology.

**5245. Plant Breeding and Biotechnology**

Three credits. Prerequisite: One of BIOL 1108, 1102, 1110; MCB 2410; SPSS 3210, 3230, 4210, or instructor consent. Not open for credit to students who have passed PLSC 3240.

Principles and applications, economic, social and environmental impacts, advantages, potentials and limitations of major traditional and modern plant breeding technologies including crossing/hybridization, polyploidy, mutagenesis, genetic engineering and genome editing.

**5250. Plant Gene Transfer Techniques**

Three credits.

Techniques of plant gene delivery and transgenic plant production. Verification and analysis of transgenic plants.

**5255. Modern and Traditional Plant Breeding Techniques**

Three credits. Prerequisite: PLSC 5245. Not open for credits to students who have passed PLSC 5250 or SPSS 3250.

Hands-on experiments for traditional and modern plant breeding techniques, including artificial crossing/hybridization, polyploidy induction, plant tissue culture and transgenic plant production, and radiation- and genome editing-mediated mutagenesis.

**5260. Transdisciplinary Research and Participatory Design in Landscape Architecture**

Three credits. Prerequisite: Instructor consent.

Theory-based lecture course exploring how trans-disciplinary research and community based participatory research can help create a predictable and equitable environment for development decisions. Field trips required.

**5270. Global Perspectives in Landscape Architecture**

Three credits. Prerequisite: Instructor consent.

Examination of the historic development and contemporary practice of landscape architecture across cultural and ecological international divides. Understanding of how the global age impacts landscape design, community planning, and sustainability frameworks.

**5410. Soil Chemistry Components**

Four credits. Not open to students who have passed SPSS 3420 or SOIL 3410.

Basic concepts of the physical chemistry of soil constituents. Topics include soil atmospheres, soil solutions, soil organic matter, soil mineralogy, and surface characteristics and analysis. Term paper required.

**5420. Soil Chemistry Reactions and Equilibrium**

Three credits.

Physical chemical characteristics of soil minerals and soil organic matter, and their reactivity with compounds present in the aqueous and vapor phase. Topics include: redox reactions, adsorption and desorption measurements, electrokinetics, adsorption modeling, and physicochemical principles of soil modification and remediation practices. Term paper required.

**5460. Sustainable Site Design**

Five credits. Prerequisite: Instructor consent. Recommended preparation: environmental design coursework and familiarity with digital design programs.

Studio-based course covering environmental, cultural, social, economic dimensions of designing sustainable outdoor sites. Conceptual planning to detailed design and analysis of regenerative site systems over a range of contexts from urban to rural sites, using qualitative and quantitative methods. Applications on service-learning and engaged scholarship projects. Field trips required.

**5470. Sustainable Coastal Land Use Planning**

Five credits. Prerequisite: Instructor consent. Recommended preparation: environmental design coursework and familiarity with digital design programs.

Studio-based course exploring the relationship between sea level rise and the necessary adaptation of society's development patterns. The majority of the course will focus on individual student planning projects. Service learning opportunities. Field trips required.

**5620. Soil Fertility**

Three credits.

Factors governing nutrient uptake by plants, fate of nutrients applied to soils, principles and practices in the use of fertilizers and amendments for crop production, laboratory and field studies of social and plant response to applied nutrients.

**5897. Seminar**

One credit. May be repeated for a total of two credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

**5898. Topics in Plant Science**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Topics and credits to be published prior to the registration period preceding the semester offerings.

**5899. Independent Study**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

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## Policy Practice (POPR)

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**5300. Advanced Macro Practice**

Three credits. Prerequisite: FED 5302 and 5352 must be taken concurrently; open to Social Work M.S.W. students in the Policy Practice concentration.

This initial course provides a contemporary and historical overview of how the macro practice methods independently and collectively can be leveraged for social change. It provides a foundation for addressing ethical obligations and challenges in macro practice, with particular focus on historically oppressed populations. In addition, students will gain an understanding of the role of leadership and use of power in community organizations and policy and practice.

**5301. Policy Practice: Process and Finances**

Three credits. Prerequisite: BASC 5390 and 5391, and FED 5351; or POPR 5353 for Advanced Standing students; open to M.S.W. students in Policy Practice concentration. Corequisite: FED 5302 and 5352, or POPR 5354 and FED 5311 for Advanced Standing students.

The definition of policy practice, the phases of policy practice and the skills needed for policy practice especially advanced analytical and interactional skills, including the conscious use of self in practice, as well as persistence, creativity, and pragmatism and taking appropriate risks in the pursuit of policy practice goals. Other content includes the use of large data sets, data management systems, quantitative analysis, qualitative methods, especially focus groups. Emphasis is given to the use of policy practice to achieve distributive

justice and implement and evaluate effective social service policies for populations at risk. Ethical requirements and dilemmas in policy practice are integrated throughout. Required course for students in the Policy Practice concentration.

### **5302. Policy Practice: Careers, Contexts, and Quantitative Analysis**

Three credits. Prerequisite: Open to Social Work M.S.W. students in the Policy Practice concentration. Corequisite: POPR 5354 and FED 5311.

Begins with content on career planning. Students will be helped to understand the complexity of social service funding, including the sources of funds and the mechanisms for transferring funds to social service programs, including federal and state tax policies and implication for social service programs. Critical current issues such as the growth of faith-based and profit-making social service strategies will be debated. Other topics will include the use of the media and public relations expertise, cutting edge social theories, micro and macroeconomic theories, and global economic policies and how they impact social service policies. Students will be expected to demonstrate an ability to integrate and critically evaluate their practice skills as they prepare to leave the program. Emphasis will be given to the use of policy practice intervention strategies to achieve distributive justice and effective service policies for populations at risk. Ethical requirements and dilemmas in policy practice will be integrated throughout the course. Required course for students in the Policy Practice concentration.

### **5310. Program Planning, Development, and Evaluation**

Three credits. Prerequisite: POPR 5300 or CORG 5300; open only to M.S.W. students in the Policy Practice or Community Organization concentration. Corequisite: POPR 5353 and FED 5310, or CORG 5353 and FED 5310, or CORG 5355.

Covers a broad range of knowledge and skills needed to develop sound program proposals and to plan, manage, and evaluate social programs. These include assessing social and community needs; setting goals within the context of strategic plans; writing measurable objectives; designing program implementation and evaluation strategies, developing a program budget, and identifying funding sources. Addresses value and ethical issues in program development, as well as constraints and opportunities that support or constrain program planning. Required course for students in the Community Organization, Administration and Policy Practice concentrations. The pre and co-requisites for this course differ for each of these concentrations. Refer to the Student Handbook for pre and co-requisite details.

### **5312. Political Advocacy**

Three credits. Prerequisite: Open to students in the Community Organization and Policy Practice concentrations. Corequisite: FED 5311; Community Organization students also take CORG 5354 concurrently, Policy Practice students also take POPR 5354 concurrently.

Builds on the concepts and interventions introduced in the Macro Foundation Practice course. Political decision-making groups, including executive, legislative, judicial and private agency

decision-making. The ways macro practitioners use power and political analysis is discussed. Emphasis is on the design, implementation and evaluation of a political advocacy strategy to improve the life situations of populations at risk, such as lobbying, preparing and delivering testimony to a public policy making group and forming and maintaining coalitions. Ethical requirements and dilemmas in doing political advocacy are integrated throughout the course. Required course for students in both the Community Organization and the Policy Practice concentrations. The co-requisites for this course differ for each of these concentrations.

### **5340. Advanced Macro Practice Skills Laboratory**

One credit.

Focuses on gaining knowledge and skills in the elements of program planning and proposal writing, and includes application of these through development of a program proposal for funding. The skills laboratory will provide an additional opportunity for students to apply knowledge and skills through a proposal review and evaluation exercise. The exercise will be conducted on the last day of the course after the students' final projects have been submitted. The instructor will choose one final project for the purposes of the review exercise with the student's name removed. (Note: more than one proposal can be selected offering an opportunity for ranking them in the exercise.) Required course for students in the Advanced Standing Option in the Administration, Community Organization, and Policy Practice Concentrations and must be taken in the summer prior to the beginning of full time study for the M.S.W. degree.

### **5353. Field Education in Policy Practice III**

Four credits. Prerequisite: Open only to M.S.W. students in the Policy Practice concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required course for students in the Policy Practice concentration.

### **5354. Field Education in Policy Practice IV**

Four credits. Prerequisite: Open only to M.S.W. students in the Policy Practice concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required course for students in the Policy Practice concentration.

### **5355. Block Placement in Policy Practice**

Eight credits. Prerequisite: FED 5302 and 5352; open only to M.S.W. students in the Policy Practice concentration. Corequisite: POPR 5310 and FED 5350); instructor consent required. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Field Education in Policy Practice for well-prepared students who have completed all course requirements except the second year of field education and the appropriate method course. Required course for students in the M.S.W. program completing a Block Field Placement.

## **Political Science (POLS)**

### **5000. Independent Study in Political Science**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 24 credits.

### **5010. Investigation of Special Topics in Political Science**

Variable (1-3) credits. May be repeated for a total of 24 credits.

### **5100. Proseminar in Political Theory**

Three credits.

Historical survey and analysis of fundamental concepts in political theory.

### **5105. Political Theory**

Three credits. May be repeated for a total of 12 credits.

Historical and conceptual analysis of selected political ideas such as justice, liberty, rights, political obligation, or the state; including an examination of one or more major schools or bodies of political thought from ancient to contemporary times.

### **5115. Theories of Human Rights**

Three credits.

Debates about the meaning of human rights and their importance.

### **5200. Proseminar in Comparative Government**

Three credits.

Political institutions and processes compared. Derivation of generalizations.

### **5215. Comparative Political Development**

Three credits.

Development of political systems in relation to socio-economic level and other conditioning factors. Political stability and change.

### **5235. Comparative Democratization**

Three credits.

Democratization and major approaches to regime change away from authoritarianism.

### **5240. Research Seminar in Comparative Politics**

Three credits. May be repeated for credit.

### **5250. Comparative Voting Behavior**

Three credits.

The effect of economic, social, and political contexts on voters, decision-making processes.

### **5260. Democratic Institutions**

Three credits.

Rules that structure access to power and policy-making process across countries; changes over time; and major political effects. Topics include the electoral system, presidentialism, government formation, legislative committees, federalism, and the courts.

### **5300. Proseminar in International Relations**

Three credits.

Current theories of and methodological approaches to international relations.

### **5305. Foreign Policy Analysis**

Three credits.

Analysis of foreign policy processes from a comparative, theoretical perspective.

**5315. International Security**

Three credits.

Political and military issues as they intersect at the international level, such as war, terrorism, alliances, and intervention.

**5322. Human Security**

Three credits.

Examination of emerging conceptions of human security, important elements of which include good governance, food, water, political, economic, and environmental security. Definition, measurement, and politics of human security. Relationship to domestic and international policy-making and advocacy.

**5325. International Political Economy**

Three credits.

Major problem areas in which politics, economics, and business intersect at the international level -- trade, foreign investment, and monetary relations. The politics and mechanisms of U.S. foreign economic policy.

**5330. International Organization and Law**

Three credits.

International cooperation to resolve economic, social, and political transnational problems.

**5335. U.S. Foreign Policy in the Middle East**

Three credits.

Examination of U.S. political, economic and strategic interests and aims in the Middle East.

**5340. Politics and Security in the Middle East**

Three credits.

Examination of security issues in the Middle East and the responses of regional actors and external powers.

**5400. Proseminar in American Politics**

Three credits.

Theory and practice of American government and politics, with an emphasis on various theoretical and methodological perspectives.

**5406. Special Topics in American Politics**

Three credits.

Advanced study of selected topics. Intensive examination of research literature dealing with particular aspects of American politics.

**5407. American Political Institutions and Policy**

Three credits.

The institutions and policy-making process of American government.

**5408. American Political Behavior**

Three credits.

The political behavior of the American public, including public opinion, voting behavior, and other forms of participation.

**5409. American Race, Gender and Ethnic Politics**

Three credits.

The politics of American race, gender and ethnicity, with a focus on disadvantaged groups and their influence on the political process.

**5410. Black Feminist Theory and Politics**

Three credits.

Major debates at the core of black feminist theory, emphasizing the ways in which interlocking systems of oppression uphold and sustain each other in contemporary U.S. politics.

**5420. Public Opinion and American Democracy**

Three credits.

Theories of democracy and what they imply about the public's capabilities and role; empirical research on the American public and public opinion in the context of democratic theory.

**5425. American Political Parties**

Three credits.

The development, organization, and role of political parties in the United States, with implications for public policy.

**5460. Social Policy**

Three credits.

**5505. Seminar in Public Law**

Three credits.

Selected topics in public law, the administration of justice, and jurisprudence.

**5510. Judicial Decision-Making**

Three credits.

The judicial decision-making process in terms of methods and models developed in the framework of the behavioral sciences.

**5515. Constitutional Interpretation**

Three credits.

An exploration of the theories and process of constitutional interpretation in the United States, with an emphasis on the role the Supreme Court plays in defending and enforcing civil liberties.

**5600. Nature of Political Inquiry**

Three credits.

The scope of political science, modes of inquiry, the role of concepts and theory. Graduate students are urged to take the course in their first semester.

**5605. Seminar in Quantitative Methods of Political Science**

Three credits.

Introduction to the data analysis techniques most often used by political scientists. Requires no previous background in statistics.

**5610. Research Design in Political Science**

Three credits.

Introduction to quantitative and non-quantitative empirical research design in political science.

**5615. Seminar in Qualitative Methods of Political Science**

Three credits. Prerequisite: POLS 5600, 5605, and 5610; department consent. May be repeated once for credit.

A survey of qualitative research methods. Training in use of case studies, comparative historical approach, interviewing and focus groups, ethnography and interpretive methods.

**6400. Research Seminars in American Politics**

Three credits.

**6500. Research Seminar in Judicial Process**

Three credits.

**6610. Research Seminar in Quantitative Methods**

Variable (1-6) credits. Prerequisite: POLS 5605. May be repeated for a maximum of six credits.

Research in quantitative applications to political data.

**Polymer Science (POLY)****5351. Polymer Physics**

Three credits.

Modern concepts relating to glassy, rubbery and organized states of bulk polymers. Considers rubber elasticity, glass-to-rubber transitions, networks, elements of crystallization, blends and interfacial phenomena.

**5352. Polymer Properties**

(Also offered as CHEG 5352.) Three credits.

Interrelationships between solid state structure, dynamics and mechanical properties of non-crystalline and semi-crystalline polymers. Considers polymer viscoelasticity, diffusion, failure mechanisms, and elementary polymer rheology.

**5367. Polymer Rheology**

(Also offered as CHEG 5367.) Three credits.

Analysis of the deformation and flow of polymeric materials. Topics include non-Newtonian flow, viscoelastic behavior and melt fracture with application to polymer processing.

**5380. Polymer Synthesis**

(Also offered as CHEM 5380.) Three credits.

Chemistry of the formation of high polymers, including kinetics, mechanisms, and stereochemistry of step growth and addition polymerization. Recent advances in polymer synthesis.

**5381. Polymer Physical Chemistry**

(Also offered as CHEM 5381.) Three credits.

A molecular description of the fundamental physico-chemical aspects of polymer solutions and solids. Considers thermodynamics, chain statistics, dynamics, and structure of polymer molecules.

**5382. Polymer Characterization I**

(Also offered as CHEM 5382.) Three credits.

Experimental techniques for characterizing polymers on a molecular level, with emphasis on the provision of a working knowledge of instrumental analysis. Experiments include dilute solution viscosity, vapor pressure osmometry, gel permeation chromatography, chemical and spectroscopic analysis.

**5384. Polymer Characterization II**

(Also offered as CHEM 5384.) Three credits.

Experimental techniques for characterizing polymers, with emphasis on provision of a working knowledge of instrumental analysis. Experiments include calorimetry, IR and fluorescence spectroscopy and X-ray structure determination.

**5395. Biopolymers**

Three credits.

Thermodynamics and kinetics of biopolymers (carbohydrates, proteins, DNA/RNA, lipids/biomembranes). Properties, applications, and connections to current research.

**5396. Polymer Processing**

Three credits.

Various polymer processing techniques: extrusion; injection molding; film and sheet processing; blow molding; thermoforming; fiber spinning; processing of thermosets and special polymers.

**5397. Nanostructural Characterization**

Three credits.

Various types of scattering techniques (diffraction, small angle scattering, reflectometry) to investigate global structure of polymeric or other soft materials ranging from Å to submicron using different probes (X-ray, neutron, light).

**6001. Seminar in Polymer Science and Engineering**

One credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Presentations by invited guest speakers on topics of current interest in various areas of Polymer Science and Engineering.

## Psychological Sciences (PSYC)

**5100. History of Psychology**

Three credits. Prerequisite: Open only to Psychological Sciences graduate students, others with consent.

Intellectual antecedents to contemporary clinical, developmental, experimental, and social psychology.

**5101. Motivation**

(Also offered as COMM 5101.) Three credits. Prerequisite: Instructor consent.

Theories of motivation considered in relation to their supporting data.

**5104. Foundations of Research in the Psychological Sciences I**

Three credits. Prerequisite: Open only to Psychological Sciences graduate students, others with consent.

Introduction to the logic of experimental design and data analysis in the psychological sciences. Analysis of group designs, especially analysis of variance, and introduction to hypothesis testing.

**5105. Foundations of Research in the Psychological Sciences II**

Three credits. Prerequisite: PSYC 5104; open only to Psychological Sciences graduate students, others with consent.

Expands on material covered in PSYC 5104, including the development and application of correlational methods specific to conducting and understanding research in the psychological sciences.

**5120. Health Psychology**

Three credits. Prerequisite: Instructor consent.

Interaction of biological, psychological, and social factors in health. Topics include disease prevention and health promotion, psychosocial factors in treatment of illness, and stress and coping processes.

**5121. Research Methods in Health Psychology**

Three credits. Prerequisite: STAT 3115Q and 5105 or equivalent statistics course; instructor consent.

Research designs, methods, and data analysis strategies used in health promotion and disease prevention research (e.g., case control studies, randomized clinical trials).

**5123. Occupational Health Psychology**

Three credits. Prerequisite: STAT 5105 or NURS 5020 or PUBH 5434; instructor consent.

Introduction to research in occupational health and the field of occupational health psychology in a proseminar format. Topics include work stress, worker participation in hazard management, epidemiology of occupational exposures, workplace incivility, and design of safe work environments.

**5131. Meta Analysis: Theory and Practice**

Three credits. Prerequisite: STAT 5105; instructor consent.

Methods of research synthesis, including the literature review and the place of quantitative methods in drawing conclusions from existing empirical research. Introduces the statistical techniques of meta-analysis, which integrates the results of independent studies addressing the same hypothesis.

**5140. Foundations in Neuropsychology**

Three credits.

An introduction to neuropsychology, including functional neuroanatomy, neurochemistry, neuropharmacology and cognitive/emotional function and dysfunction.

**5141. Neuropsychological Assessment**

Three credits. Prerequisite: PSYC 5140; instructor consent.

An introduction to clinical neuropsychological assessment, including review of neuroanatomy and neuropsychological functions, common syndromes of neuropsychological dysfunction, specific tests to measure neuropsychological functions and professional issues for the neuropsychologist.

**5150. Neurodevelopment and Plasticity**

(Also offered as COGS 5130.) Three credits. Prerequisite: Open only to graduate students in Psychological Sciences; Speech, Language and Hearing Sciences; and Physiology and Neurobiology; instructor consent required.

Overview of brain development including embryonic neurogenetics; evolution and evo-devo; how emergent behavioral capabilities reflect neural growth in neurobehavioral development; and how disruptions of neurodevelopment cause developmental disabilities. Offered alternating years in spring semester.

**5170. Current Topics in Psychology**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Selected topics in psychology are studied with particular attention to recent developments in the field.

**5171. Special Topics in Cognitive Science**

Three credits. May be repeated for up to 12 credits with change in content.

**5200. Behavioral Neuroscience Research Seminar**

Two credits. Prerequisite: Instructor consent. May be repeated for a total of eight credits.

Seminar on current research, with intra- and extra-mural colloquium speakers.

**5228. Neuropsychopharmacology**

Three credits. Prerequisite: Instructor consent.

Review of the anatomy and physiology of the CNS and then discuss the effects of pharmacological agents on it. Topics include general anesthetics, hypnotics and sedatives, anticonvulsants, alcohol, muscle relaxants, tranquilizers, hallucinogens, and

narcotics. Student presentations will treat topics relating the CNS and behavioral pharmacology.

**5251. Neural Foundations of Learning and Memory**

Three credits. Prerequisite: Instructor consent.

Examination of the processes involved in habituation, conditioning, learning, and memory through a study of the neural elements and systems involved in their production and maintenance.

**5257. Physiological Psychology Laboratory**

Three credits. Prerequisite: Instructor consent.

Techniques used in the study of physiological psychology, including ablation, electrical and chemical stimulation, and electrophysiological recording of the nervous system.

**5270. Current Topics in Behavioral Neuroscience**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated credit.

Special problems or areas of research are studied with particular attention to recent developments in the field.

**5271. Special Topics in Behavioral Neuroscience**

Three credits. May be repeated for a total of 12 credits with a change in topic.

**5285. Neurobiology of Aging: Changes in Cognitive Processes**

Three credits. Prerequisite: Instructor consent.

Neural basis of age-related changes in learning and memory. Both the normal aging process and age-related pathologies examined. Encompasses both animal models and human data.

**5300. Research Seminar in Clinical Psychology**

One credit. Prerequisite: Open only to graduate students in the Clinical Psychology concentration. May be repeated for a maximum of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Advanced seminar presentations by faculty, graduate students, and visiting speakers on current theoretical developments and empirical research in clinical psychology.

**5301. Practicum in Interviewing and Cognitive Assessment**

Three credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration.

An introduction to psychological assessment with supervised practice in administering and interpreting clinical interviews and psychological tests.

**5302. Adult Psychopathology**

Three credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration.

Theoretical and descriptive overviews of mental disorder that afflict adults, emphasizing etiology, diagnosis, and conceptualization.

**5303. Developmental Psychopathology**

Three credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration.

An examination of diagnosis, etiology, and prognosis in child psychopathology.

**5304. Practicum in Personality Assessment**

Three credits.

Supervised practice in administration and interpretation of clinical tests and case history

material, report writing and discussion of implications of diagnostic data for therapeutic procedures.

### **5305. Psychodynamics**

Three credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration.

Overview of theoretical and empirical literature about theories of personality development and models of behavior change processes.

### **5306. Professional Issues in Clinical Psychology**

Three credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration.

An examination of the relations among the law, ethical issues, and professional practices of clinical psychologists and of other providers of mental health services.

### **5307. Empirically Supported Therapy**

Three credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration.

Instruction in and supervised practice of empirically supported therapeutic techniques and treatments.

### **5322. Methods of Child and Family Therapy in Clinical Psychology**

Three credits. Prerequisite: PSYC 5307; open only to Psychological Sciences graduate students in the Clinical Psychology concentration.

Overview of multiple intervention models for therapy with children and families.

### **5332. Research Design and Test Construction**

Three credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration.

Theoretical issues and practical problems in developing valid measures of personality variables and in designing experimental and quasi-experimental research.

### **5344. The History and Systems of Psychology**

One credit. Prerequisite: PSYC 5307; open only to Psychological Sciences graduate students in the Clinical Psychology concentration.

An overview of the trends in philosophy and early psychology that shaped the present course of the discipline.

### **5370. Current Topics in Clinical Psychology**

Three credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration; instructor consent required. May be repeated for credit.

### **5371. Special Topics in Clinical Psychology**

Three credits. May be repeated for a total of 12 credits with a change in topic.

### **5399. Clinical Psychology Research Group**

One credit. Prerequisite: Open only to graduate students in the Clinical Psychology concentration; instructor consent required. May be repeated for a maximum of 12 credits.

Discussion of ongoing research of faculty and graduate students

### **5400. Research Seminar in Developmental Psychology**

One credit. Prerequisite: Open only to Psychological Sciences graduate students; instructor consent required. May be repeated for a maximum of 12 credits.

Current research in developmental psychology, with intra- and extramural speakers and directed readings.

### **5410. Advanced Developmental Psychology**

Three credits. Prerequisite: Instructor consent.

Undertakes, at an advanced level, a developmental treatment of child behavior on the basis of experimental findings and psychological theory.

### **5420. Cognitive Development**

Three credits. Prerequisite: Instructor consent.

Current theory and research on children's conceptual development.

### **5424. Cognitive Neuroscience of Language across the Lifespan**

(Also offered as COGS 5150.) Three credits. Prerequisite: Open only to Psychological Sciences, Linguistics, and Speech, Language and Hearing Sciences graduate students.

The cognitive neuroscience approach to the study of language across the lifespan. Recent advances in neuroimaging techniques such as MRI, ERP, TMS, and fNIRS are combined with classic lesion studies to address the neurobiological bases of typical and atypical language processing.

### **5425. Developmental Cognitive Neuroscience**

Three credits.

Survey of current research and methods in developmental cognitive neuroscience, an interdisciplinary scientific field at the boundaries of neuroscience, developmental psychology, and cognitive science.

### **5440. Development of Language and Related Processes**

Three credits. Prerequisite: Open only to Psychological Sciences graduate students, others with consent.

Experimental and descriptive study of the child's language processes, with emphasis on acquisition, structure, meaning, thought, and the influence of verbal processes on nonverbal behavior.

### **5441. Language Modality, Neural Plasticity, and Development**

Three credits. Prerequisite: Open only to Psychological Sciences, Linguistics, and Speech, Language and Hearing Sciences graduate students.

An integrative approach that reveals the contribution of sign language research to the understanding of human neural plasticity. Diverse research programs and methodologies (e.g., emerging languages, neuroimaging) are combined with behavioral studies (e.g., cognitive psychology) to address the effects of variable language experiences on language development, cognitive development, and neural organization for language.

### **5445. Neurobiology of Language: Typical and Atypical Cognition and Language Development**

(Also offered as COGS 5140.) Three credits. Prerequisite: Open only to Psychological Sciences, Linguistics, and Speech, Language and Hearing Sciences graduate students. Recommended preparation: one of COGS 5110, 5120, 5130, 5150; LING 5110; PSYC 5440; or SLHS 5348.

Survey of current research on language acquisition in developmentally delayed/pathological populations, including but not

restricted to Autism, Williams Syndrome, Down Syndrome, and Specific Language Impairment. Examination of what the language delays and deficits reveal about each disorder, the processes of language acquisition, the representation and organization of language, and the biology/neuropsychology/genetics of language.

### **5450. Infancy and the Effects of Early Experience**

Three credits. Prerequisite: Instructor consent.

Data and theory concerning the effects of early experience in infancy on behavioral and physiological development. Cross-species comparisons are emphasized.

### **5460. Social and Personality Development**

Three credits. Prerequisite: Instructor consent.

Fundamental research and theory on social behavior, social cognition, and interpersonal relations in the preschool period (2-6 years) and in middle childhood (6-12 years). Early childhood precursors and consequences in adolescence. Both normative and atypical development.

### **5470. Current Topics in Developmental Psychology**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

Selected topics in developmental psychology are studied with particular attention to current research and theoretical trends.

### **5471. Special Topics in Developmental Psychology**

Three credits. May be repeated for a total of 12 credits with a change in topic.

### **5499. Research Team in Developmental Psychology**

One credit. Prerequisite: Open only to Psychological Sciences graduate students; instructor consent required. May be repeated for a maximum of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Planning and execution of both individual and collaborative research projects in developmental psychology.

### **5500. Research Seminar in Language and Cognition**

One credit.

### **5513. Memory**

Three credits. Prerequisite: Instructor consent.

Contrasts associationist, cognitive, connectionist, and cognitive neuroscience approaches to issues involving short-term memory, long-term memory, and the representation of knowledge.

### **5515. Connectionist Models**

Three credits. Prerequisite: Instructor consent.

Connectionist models in psychology and computational neuroscience. Topics include learning, memory, and language processes in both intact and damaged networks.

### **5553. Introduction to Nonlinear Dynamics**

Three credits. Prerequisite: Instructor consent.

Basic concepts and methods of nonlinear dynamics systems theory applied to behavioral time-series data.

**5554. Advanced Nonlinear Dynamics for the Behavioral Sciences**

Three credits. Prerequisite: PSYC 5553; instructor consent.

Advanced concepts and methods of nonlinear dynamics systems theory applied to behavioral time-series data.

**5564. Dynamics of Language and Cognition**

Three credits.

Application of dynamical systems theory to language modeling.

**5567. Cognition**

Three credits.

An introduction to theories of human cognition.

**5568. Psychology of Language**

Three credits. Prerequisite: Instructor consent.

Psychological aspects of linguistic structure, with particular attention to phonology.

**5570. Current Topics in Cognitive Science**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

Special topics in cognitive systems theory are reviewed with particular emphasis on techniques for the intrinsic measurement of systems behavior including information processing capacities and goal achievements. Students are required to apply the techniques discussed to an ongoing research topic of their own choosing.

**5571. Sensation and Perception I**

Three credits. Prerequisite: Instructor consent.

Relations among physical, physiological, and psychological variables in selected sensory and perceptual processes. Attention is given to problems of measurement, empirical findings, and theoretical interpretations.

**5572. Sensation and Perception II**

Three credits. Prerequisite: PSYC 5571.

A continuation of PSYC 5571.

**5574. Control and Coordination of Action**

Three credits. Prerequisite: Instructor consent.

Covers the ecological approach; movement as the product of a representational/computational system; intentionality; physical principles of self-organization and cooperativity; task dynamics. Problems in the physiology of activity, prosthetics and robotics are addressed.

**5583. Sentence and Discourse Processing**

Three credits.

How psychological theories of perception and learning provide insight into language processing at the level of sentence structure and discourse structure.

**5600. Research and Practice of Industrial/Organizational Psychology**

One credit. Prerequisite: Instructor consent. May be repeated for a total of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Current research and practice in industrial/organizational psychology, with intra- and extramural speakers.

**5611. Work Motivation**

Three credits. Prerequisite: PSYC 5613; instructor consent required.

Major theoretical approaches to work motivation and their implications for the design of work settings and the treatment of workers.

**5612. Leadership in the Workplace**

Three credits. Prerequisite: PSYC 5613; instructor consent required.

Theoretical and research issues associated with leadership in the workplace. Classical and current theories of leadership, research in leadership development, and evaluation of various leadership models.

**5613. Organizational Psychology**

Three credits. Prerequisite: Open only to doctoral students in the Industrial and Organizational Psychology concentration, others with consent.

Major research lines in organizational behavior (work motivation, leadership, work attitudes, job design, turnover, absenteeism), with attention to emerging areas (e.g., women in management). Emphasis on research methods and analytic strategies.

**5614. Personnel Psychology**

Three credits. Prerequisite: Open only to doctoral students in the Industrial and Organizational Psychology concentration, others with consent.

Techniques of personnel psychology: recruitment, selection, placement, evaluation, training, development, and related areas.

**5615. Human Factors**

Three credits. Prerequisite: Open only to doctoral students in the Industrial and Organizational Psychology concentration, others with consent.

Theories of design and analysis of man-machine systems in an industrial/organizational context. Special emphasis on the human as an information-processing sub-system operating with other people and machines in complex systems. Application of psychological principles to design of industrial workplaces, military systems, and consumer products; and to the design of simulation systems for training.

**5616. Human Judgment and Decision Process**

Three credits. Prerequisite: Open only to doctoral students in the Industrial and Organizational Psychology concentration, others with consent.

Examination of social judgment methodology, judgmental heuristics and biases, process tracing, bootstrapping, behavioral decision theory, and multi-attribute utility measurement.

**5617. Occupational Health and Safety**

Three credits. Prerequisite: PSYC 5615; instructor consent.

Research methods, theories and findings related to the impact of work duties and environmental conditions on occupational safety and health.

**5618. Selection and Placement**

Three credits. Prerequisite: PSYC 5614; instructor consent.

Theory and research on employee selection and placement. Selection models, employee testing, statistical methods in selection and placement, equal opportunity and EEOC guidelines and related ethical issues.

**5619. Performance Appraisal**

Three credits. Prerequisite: PSYC 5614.

Methods and issues in performance rating in organizations. Classic studies and current models

of performance evaluation are used to explore factors that enhance or hinder the accurate gathering, evaluation, and communication of employee performance information.

**5620. Design and Analysis of Human-Machine Systems**

Three credits. Prerequisite: PSYC 5615; instructor consent.

The basis, in theories of perception and learning, for design of complex human-machine systems.

**5670. Current Topics in Industrial/Organizational Psychology**

Three credits. Prerequisite: Instructor consent. May be repeated for credit.

Selected topics in industrial/organizational psychology are studied with particular attention to current research and theoretical trends. Topics vary by semester.

**5671. Special Topics in Industrial/Organizational Psychology**

Three credits. May be repeated for a total of 12 credits with a change of topic.

**5699. Research Team in Industrial/Organizational Psychology**

Variable (1-3) credits. Prerequisite: Open only to Psychological Sciences graduate students; instructor consent. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Planning and execution of both individual and collaborative research projects in industrial/organizational psychology. This course may be repeated for credit.

**5700. Proseminar in Social Psychology**

One credit. Prerequisite: Open only to graduate students in the Social Psychology concentration; instructor consent required. May be repeated for a maximum of 10 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Presentations on current research in all areas of social psychology.

**5701. Experimental Social Psychology**

Three credits. Prerequisite: Instructor consent.

A critical overview of the various laboratory methods and techniques in social psychology.

**5702. Field Research Methods**

Three credits. Prerequisite: PSYC 5701.

An examination of various methods of field research, focusing on design, analysis, theory, and practical issues.

**5703. Advanced Social Psychology**

Three credits. Prerequisite: Open only to graduate students in the Social Psychology concentration, others with consent.

An overview of the field of social psychology organized around the major underlying theoretical orientations. Several positions are critically examined along with representative empirical work.

**5711. Behavioral and Social Aspects of HIV/AIDS**

Three credits. Seminar. Prerequisite: Open to graduate students across all departments and advanced undergraduates with permission.

Comprehensive overview of the global HIV/AIDS epidemic and its behavioral underpinnings,

including the consequences of HIV/AIDS epidemics for individuals, families, communities, and societies.

### **5770. Current Topics in Social Psychology**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 28 credits.

Topics vary by semester. Recent topics have included Professional Development, Health Psychology, Morality, Cross-cultural Psychology, Social Processes of AIDS, Ecological Social Psychology, Stereotypes and Prejudice.

### **5771. Special Topics in Social Psychology**

Three credits. May be repeated for a total of 12 credits with a change of topic.

### **5799. Research Team in Social Psychology**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Planning and execution of both individual and collaborative research projects in social psychology.

### **5800. Research in Psychology**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

### **5801. Independent Study in Psychology**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

### **6136. Seminar in Quantitative Research Methods**

Three credits. Prerequisite: Instructor consent.

Quantitative research culminating in a research methods paper. Intended as the capstone course for the Quantitative Research Methods graduate certificate following completion of other courses in the certificate program.

### **6141. Practicum in Neuropsychological Assessment**

Three credits. Prerequisite: PSYC 5301, 5140, and 5141; instructor consent. May be repeated for credit.

Field placements in clinical neuropsychology. Students will be placed in area hospitals, rehabilitation centers, or on campus, where they will perform neuropsychological evaluations under supervision and attend clinical rounds and team meetings.

### **6300. Clerkship in Clinical Methodology**

Variable (1-6) credits. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Supervised clinical training in a community facility.

### **6301. Practicum in Adult Psychotherapy**

Variable (1-3) credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration, others with consent. May be repeated for a maximum of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Supervised psychotherapy training with adults including diagnostic procedures.

### **6302. Practicum in Child Psychotherapy**

Variable (1-3) credits. Prerequisite: Open only to graduate students in the Clinical Psychology concentration, others with consent. May be

repeated for a maximum of 12 credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Supervised psychotherapy training with children and parents including diagnostic procedures.

### **6303. Didactics of Supervision and Consultation**

Three credits. Prerequisite: PSYC 5301, 5304, 6301, and 6302; open only to graduate students in the Clinical Psychology concentration. May be repeated once for credit.

Exposure to theories, models, and empirical data pertinent to providing quality supervision of the psychodiagnostic and psychotherapeutic activities of mental health professionals.

### **6304. Practicum in Clinical Supervision**

Three credits. Prerequisite: PSYC 5301, 5304, 6301, and 6302; open only to graduate students in the Clinical Psychology concentration. May be repeated for a maximum of 12 credits.

Supervised training in supervising psychodiagnostic and psychotherapeutic activities of less advanced clinical psychology students.

### **6310. Internship in Clinical Psychology**

Zero credits. Prerequisite: Instructor consent.

Students assume professional psychological assessment, psychotherapeutic, and consultation responsibilities under the direct supervision of licensed clinical psychologists.

### **6505. Teaching Experimental Psychology**

Three credits.

The lecture method applied to teaching undergraduate courses in experimental psychology (introductory, cognition, learning and memory, sensation and perception) and giving conference presentations. Attention is given to presentation style and content.

### **6732. Attitude Organization and Change**

Three credits. Prerequisite: Open only to Psychological Sciences graduate students, others with consent.

An overview of the field of attitude theory and research focusing on problems of attitude formation, attitude organization, and attitude change.

### **6733. Social Cognition**

Three credits.

Study of causal attribution, stereotyping, evaluating, judgement and decision-making, persuasion, expectancies, memory, attention as they pertain to social life.

### **6750. The Social Psychology of Stigma**

Three credits. Prerequisite: Instructor consent.

Classic and current theories and research on stigma are covered. General stigma processes as well as group-specific (e.g., race, gender, mental illness) issues will be discussed.

### **6771. Intergroup Relations**

Three credits.

Marxism, social identity theory, realistic group conflict theory, elite theory, equity theory, relative deprivation, authoritarian personality, social dominance theory and evolutionary theory as it pertains to intergroup and gender relations.

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## **Public Health (PUBH)**

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### **5201. Essentials of Social Inequality and Health Disparities**

Three credits.

Introduction to (a) the extent of health disparities across the US population, (b) how social inequality contributes to health disparities, and (c) why attention to social inequality is essential to the effective practice of clinical medicine and dental medicine. Examination of how society's social, economic, political and cultural institutions are structured and why they perpetuate the unequal distribution of opportunities that systematically limit the life chances and experiences of individuals. A range of social determinants (race/racism, poverty, income inequality, education, environmental conditions, social capital, social cohesion, social mobility, safety/security, criminal justice system) are considered that may influence health, either directly or as pathways for other determinants. Addresses the function of public health assessment, provides students with a conceptual basis for the complementary course, PUBH 5202.

### **5202. Eliminating Social Inequality and Health Disparities**

Three credits.

Examination of the evidence for structural, community, and individual-level interventions to reduce the impact of inequity on health and health care utilization. Identification and implementation of multi-level interventions that may reduce inequities by altering the social, economic, and other structural aspects of the environment. It will also address challenges of implementation and ways to reduce potential barriers. The course builds on the conceptual basis of PUBH 5201.

### **5401. Principles of Epidemiology**

Three credits.

Introduction to epidemiological concepts and methods as applied to public health research, community diagnosis, prevention, health planning and evaluation studies. Intensive use of exercises in descriptive and analytic epidemiology based on current investigations.

### **5402. Introduction to Biostatistics**

Three credits.

Introductory presentation of the fundamentals of biostatistical theory and application, aimed at developing competence in the use of statistics, probability distributions, hypothesis testing, inference and estimation as applied to the most commonly used techniques in parametric and nonparametric statistical methods. Critical appraisal of research reported in journal articles serves as an application of learned techniques.

### **5403. Health Administration**

Three credits.

Examination of past, present, and proposed approaches to the organization and management of health care services. Emphasis is on the role and functioning of the manager and the evolution of health care policy and trends as they affect managerial roles.

### **5404. Environmental Health**

Three credits.

Explores the policy, political and public health implications of such issues as air pollution, drinking water, exposure to hazardous chemicals, indoor air pollution, food protection, lead poisoning, housing, international issues, etc. Provides the student with some basic technical information and familiarity with terms for a better understanding of policy and political decisions and health effects of environmental exposures.

#### **5405. Social and Behavioral Foundations of Public Health**

Three credits.

Introductory survey emphasizing basic social science concepts in the analysis of public health including orientations toward health, disease and health care, the origins and distribution of health care resources, and the role of social movements and research in improving public health.

#### **5406. Law and Public Health**

Three credits.

Introduction to the American legal system as it relates to health care and public health. Sessions present important applications of law to health including the powers of state governments, public health at the federal level, hospital, physician and HMO liability, emergency care and medical research, mental health law, reproductive health and the right to privacy, the right to refuse treatment and end of life issues, privacy and confidentiality in health care, infectious disease law and disability discrimination, and public health policy and advocacy.

#### **5407. Practicum in Public Health**

Variable (1-3) credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Under faculty guidance, students undertake an organized set of activities that responds to an identified need of a public health agency or health-related organization. The activities may involve the policy development, planning, implementation, administration or evaluation of public health services, or a combination of such activities. Students should be appropriately advanced before initiating the practicum.

#### **5408. Introduction to Epidemiology and Biostatistics I**

Three credits. Prerequisite: Open only to students in the MPH program, others with consent.

This is the first of a two-course sequence introducing students to concepts and methods of epidemiology, biostatistics and public health research. Topics include nature of variability, common probability distributions, causal reasoning, control of bias and confounding, descriptive and analytic design of observational and experimental studies, principles of disease screening and clinical efficacy.

#### **5409. Introduction to Epidemiology and Biostatistics II**

Three credits. Prerequisite: PUBH 5408; open only to students in the MPH program, others with consent.

This continuation of a two-course sequence on basic epidemiology, biostatistics and public health research addresses hypothesis generation, data collection methods, point and confidence interval estimation, inference testing, correlation/regression analysis, multivariable interaction,

effect modification, power and meta-analysis. Evaluation of study designs, research methods and statistical procedures in clinical and public health literature will be stressed.

#### **5410. Fundamentals of Strategic Planning**

Three credits.

Fundamentals of strategic planning for public and non-profit organizations emphasizing the development of mission and vision statements, stakeholder analysis, scanning of internal and external environments; formulation and implementation of goals and objectives, definition of strategic issues, program planning, and evaluation. Introduction to related concepts in long range planning and group decision making. A group strategic planning project caps the course.

#### **5414. Health Economics**

Three credits.

Introduction to economic theory and various applications of economics in the analysis of the U.S. health care system.

#### **5416. Principles of Quality Improvement**

Three credits.

Quality improvement (QI) is the art and science of improving quality of care by continuously making small improvements in key steps or processes. Because systems of care are inherently complex, people need tools and methods to recognize and prioritize what changes are necessary and to know how to implement and evaluate such changes. Several basic principles or concepts underlie QI efforts, such as variation, leadership, systems thinking, and the psychology of motivation. This course will describe critical principles and concepts important to QI and will illustrate their practical application to health care settings.

#### **5419. Public Health Agencies**

Three credits.

Takes organization and management theory into practice. The focus is on governmental and non-profit agency management and administration. Emphasis is on developing and defending budgets, personnel management, working within the political context, with the community and with multiple agencies.

#### **5430. Public Health Informatics**

Three credits.

An overview of the basic information skills required to clarify a health-related information need and identify and use appropriate information resources to select materials that answer that need. The course will include discussions of health-related networks and information resources, demonstrations of their appropriate use, class exercises and a semester project.

#### **5431. Public Health Research Methods**

Three credits.

Introduction to conceptualization, methods, and analysis in public health research including formulation of research questions and hypotheses, development of research and analytic models, use of qualitative (interviewing and observation) and quantitative (secondary and survey data) data collection methods, and qualitative and quantitative data analysis leading to the formulation of research projects.

#### **5432. SAS Programming and Data Management**

Three credits.

Focuses on SAS programming to introduce the most commonly used features of the language, including data definition, modification and organization; data manipulation and selection; data display and basic data analysis using descriptive statistics. Students also learn to create datasets using data entry or importing from other programs.

#### **5433. Health Program Evaluation**

Three credits.

Methods of evaluating the implementation and impact of health programs. Topics include specification of program objectives and components, experimental and quasi-experimental evaluation designs, collection and analysis of program data, and the dissemination and application of evaluation results.

#### **5434. Topics in Intermediate Biostatistics**

Three credits.

An introduction to the interplay of experimental design and data analysis. Begins with a review of statistical estimation and testing. Topics include analysis of variance, linear regression, and power analysis. Applications are emphasized through the demonstration and use of statistical software.

#### **5436. Intermediate Epidemiology**

Three credits.

Major design and implementation issues in epidemiology and biomedical research. By the conclusion of the course, the student should have a better appreciation of the importance and complexities of epidemiological investigation.

#### **5440. Public Health Issues in Genetics**

Three credits.

The Human Genome Project and other research initiatives are providing us with new opportunities to screen, diagnose and provide novel interventions for a range of genetically determined diseases. The goal of this course is to provide sufficient understanding of inheritance patterns and genetics technology to appreciate the associated public health issues.

#### **5451. Maternal and Child Health Policy and Programs**

Three credits.

Examination of maternal and child health (MCH) programs and policy from the past to the present. Children's rights, advocacy and MCH history provide a foundation to understanding the philosophy and importance of MCH. The health and development of children are addressed starting with families and working through each of the developmental cycles: maternal and infant health, preschool, school age, and adolescent health. Topics that are cross-cutting across the MCH spectrum such as health disparities, women's health and international health.

#### **5452. Injury and Violence Prevention**

Three credits.

Injury and violence are major preventable public health problems with predictable patterns. The purpose of this course is to familiarize the student with the epidemiological literature of intentional and unintentional injuries. Focuses on the knowledge and skills required to design, implement, and evaluate scientifically sound

community injury prevention and control programs.

#### **5453. Chronic Disease Control**

Three credits.

Chronic diseases are examined from clinical, epidemiological and program planning perspectives. Diseases examined include selected neoplastic diseases, cardiovascular diseases, chronic obstructive pulmonary diseases, cerebrovascular disease and diabetes. The role of public health agencies, for profit and non-profit entities in research, education, and risk reduction activities also are covered.

#### **5454. Infectious Disease Control**

Three credits.

Overview of microbiology. Agent-host environment relationship in causation and control of infectious diseases. Epidemiological patterns of major infectious diseases, with emphasis on sexually transmitted diseases, respiratory conditions and nosocomial infections.

#### **5455. Health Education**

Three credits.

Methods for planning, presenting, and evaluating health education programs in communities, schools and worksites. Includes use of the Precede Model, setting of goals and objectives, behavior modification theory, group processes, teaching techniques and activities for developing and presenting workshops or courses.

#### **5460. Health and Human Rights**

Three credits.

Explores the many ways in which human health and well-being are related to human rights. Human rights are a field of international law that includes major treaties, treaty bodies, and adjudicatory mechanisms. This course will review the ways in which human rights instruments and jurisprudence have addressed health and issues related to health. Students will also study a wide range of substantive public health issues that have a human rights dimension, and consider the ways that human rights are used as advocacy tools to improve the structural environment that shapes the public's health.

#### **5462. International Health**

Three credits.

Examines primary health care as a model suited to the health needs of developing nations. Provides a broader understanding of the genesis of illness in developing countries and analyzes the kind of care required to have an impact on these illnesses.

#### **5463. Comparative Health Systems**

Three credits.

An analysis of national health systems in relation to their socio-economic, political, cultural, and epidemiologic contexts. The examination of alternative approaches to organizing scarce health care resources serves as an integrating theme.

#### **5465. Occupational Health**

Three credits.

Recognition and prevention of occupational disease and injuries, including social and political aspects and policy issues such as OSHA and Workers' Compensation laws. Overview of some of the major occupational disease issues. Approaches of industrial hygiene, ergonomics, and

occupational epidemiology to understanding and preventing occupational health hazards.

#### **5468. Occupational and Environmental Epidemiology**

Three credits.

Topics include the history of occupational epidemiology, causal models, occupational exposure classification systems, environmental epidemiology, cohort mortality studies, cross-sectional surveys, case-control studies, ecologic studies, and statistical and methodological issues in research design and their solutions.

#### **5472. Disability and Public Health**

Three credits.

Examines both developmental and acquired disabilities from a public health perspective. Public health issues of cognitive and physical disability, including prevention, diagnostic and definitional considerations, epidemiological and statistical controversies, legal and ethical aspects, treatment considerations and research concerns.

#### **5473. Women, Public Health and Reproduction**

Three credits.

The history of reproduction and public health issues in the U.S.; underlying ethical issues in modern reproductive health care and key components of opposing views; major financial, social and emotional considerations in policy making and the increasing role that reproductive health plays in public health as a whole.

#### **5474. Urban Health**

Three credits.

Comprehensive overview of historical forces and social factors related to the health status of African-Americans, Hispanics, and other minority groups in American society. Although much of the course content examines current minority health issues, the use of theory and research to identify underlying causes and to suggest practical strategies/interventions for addressing these problems is a major focus.

#### **5475. Public Health and Policy in an Aging Society**

Three credits.

Examines the demographics of aging; organization, financing and delivery of health services for older adults; formal and informal caregiving; retirement and housing policy; and end of life care. Policy and ethical aspects of these topics are explored. Research-oriented, integrating empirical evidence to illustrate central concepts. Familiarity with basic principles of research design, including ability to critically read and synthesize scientific literature, is important.

#### **5476. Community Mental Health**

Three credits.

Overview of mental illness, substance abuse and related conditions, including epidemiological patterns and interventions. Chronic mental patients, the homeless mentally ill and other special groups. The community mental health movement and role of government. Regulations and mental health law.

#### **5477. Food, Health and Politics**

Three credits.

Comprehensive overview of the factors that influence how our food is grown; what foods are available, affordable, and advertised; and the ensuing public health implications. Examines

the history of food production in America, the development of public and private food assistance programs, the fast food movement, and food marketing. Students will explore the political, social, economic and environmental factors that impact food availability and consumption, and discuss the implications of these factors on health outcomes, such as obesity, hunger, chronic diseases, and health disparities.

#### **5478. Epidemiology of Substance Use Disorders and Psychiatric Co-Morbidities**

Three credits. Not open to students who have passed PUBH 5497 when taught as Epidemiology of Substance Use Disorders.

Comprehensive survey of epidemiological research methods as they apply to substance use disorders and related psychiatric comorbidities. Review of epidemiological research on the prevalence of the major substance use disorders and discussion of what is known about the etiology, treatment and prevention of these disorders. Incorporates recent advances in social and psychiatric epidemiology as well as health disparities attributable to sex/gender and race/ethnicity. Intended for, but not limited to, matriculated MPH students, public health professionals, health care providers, and the mental health and addiction workforce.

#### **5479. Alcohol and Drug Policy Research**

Three credits.

Policymakers and government officials are increasingly seeking answers to practical questions about the impact of policies and programs on the health of the population, as well as on crime rates, traffic accidents and harm to others. Discussion of the measures, methods and research designs used to investigate alcohol and drug policy issues, including prevention science. Intended for, but not limited to, matriculated MPH students, public health professionals, health care providers, and the mental health and addiction workforce.

#### **5480. Clinical and Social Service Systems Research in Alcohol and Addiction Science**

Three credits.

Focus on how to conduct clinical and health services research on treatment and early intervention services and how to critically evaluate research evidence. Assessment procedures, research designs, sampling techniques, and mediators and moderators of treatment effects at both the individual and systems levels of analysis. Intended for, but not limited to, matriculated MPH students, public health professionals, health care providers, and the mental health and addiction workforce. It is recommended that students have completed (or are in process of completing) coursework in statistics, epidemiology and/or research methods.

#### **5481. Research Careers and the Responsible Conduct of Research in Alcohol and Addiction Science**

Three credits. Prerequisite: At least two of PUBH 5478, 5479, and 5480, one of which may be taken concurrently, or by instructor consent.

Designed to achieve three objectives: 1) Teach students about the responsible conduct of research and ethical research practices; 2) Provide guidance on how to develop a sound research proposal by guiding students through the public and private

grant writing process; and 3) Review career options and employment opportunities in addiction science.

#### **5495. Independent Study in Public Health**

Variable (1-9) credits. May be repeated for credit.

An individual course for those wishing to pursue special topics in the public health sciences under faculty supervision.

#### **5497. Graduate Seminar in Public Health**

Variable (1-6) credits. May be repeated for credit.

#### **5498. Field Experience in Public Health Systems**

Variable (3-9) credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Under direction by field preceptors, students will participate in an intensive service-learning experience wherein they will examine a timely public health issue from the perspective of health indicators/disease surveillance; policy development; planning, implementation, or evaluation of public health services; essential public health functions; and operational issues of a large complex public health agency/organization.

#### **5499. Capstone Project in Public Health**

Variable (3-6) credits. Prerequisite: Department consent.

#### **5501. Foundations of Public Health and Disability**

Three credits. Prerequisite: Open only Disability Studies in Public Health certificate students, others by instructor consent.

Introductory survey of the ways in which disability, both developmental and acquired, is affected by, and interacts with, public health policy and practice. Students will have a foundational understanding of a comprehensive set of issues of both acquired and developmental disability as related to the core elements of public health as framed by the 10 Essential Public Health Services.

#### **5502. Epidemiology of Disability**

Three credits. Prerequisite: PUBH 5501; open only Disability Studies in Public Health certificate students, others by instructor consent.

Introduces epidemiologic research design and delves deeply into epidemiology as it applies to monitoring the health status of people with disabilities, diagnosing and investigating health problems, evaluating personal and population-based interventions, and conduct of research as uniquely affecting and affected by disability. Critically examines sources of public health and epidemiologic data that exist.

#### **5503. Disability Law, Policy, Ethics, and Advocacy**

Three credits. Prerequisite: PUBH 5501; open only Disability Studies in Public Health certificate students, others by instructor consent.

Introduction to policy and law affecting people with disabilities and public health approaches to meeting their individual needs as well as the needs of broader populations. Federal disability laws are reviewed in terms of both their implications and the implications of public health ethics on people with disabilities. Reviews the role courts have played in further shaping disability policy and the influence of public health ethics and the disability rights movement on decision-making in public health. Policy, legal and advocacy implications for

public health at the international level, and essential tools for enforcing laws and regulations that protect health and ensure safety and for developing new policies and plans that support individual and community health efforts inclusive of people with disabilities.

#### **5504. Public Health Interventions in Disability**

Three credits. Prerequisite: PUBH 5501, 5502, and 5503; open only Disability Studies in Public Health certificate students, others by instructor consent.

Final course in the Certificate of Interdisciplinary Disability Studies in Public Health. Aligns with the 10 Essential Public Health Services. Critically examines public health systems and programs across the lifespan available to people with disabilities that impact health. Extends on foundational principles that are evidence-based and driven by epidemiologic studies of disability within the context of existing laws and policies.

#### **6490. Public Health Seminar**

One credit. May be repeated for a total of four credits.

This student-centered seminar series will meet weekly in both the Fall and Spring semesters of the student's first two years and will introduce the students to a broad range of faculty and outside speakers in public health. The seminar will follow a cycle where students read and discuss papers for an upcoming presenter, the next week the speaker will present and participate in discussion and questions and answers, and the following week there will be a student presentation. During their fourth semester, students will present an overview of the literature supporting their proposed research project. This seminar is common to all students in the doctoral program in public health.

#### **6491. Advanced Topics in Social and Behavioral Foundations of Public Health**

One credit. Corequisite: PUBH 5405; instructor consent required.

This seminar course will be given in parallel with PUBH 5405 with the goal of more in-depth exploration of the topics presented in the survey course. The objective is to gain a more advanced understanding of the concepts and theories in the social and behavioral sciences and their ability to explain patterns of health, illness and health care utilization, practices and policies. In conjunction with the survey course, the biopsychosocial paradigm of health and illness will provide the conceptual framework for integrating the societal, interpersonal, and intrapersonal factors that influence the public's health.

#### **6492. Advanced Topics in Health Promotion, Disease and Disability Prevention**

One credit. Prerequisite: instructor consent. Corequisite: AH 6324.

An in-depth examination of health promotion and disease and disability prevention policies, programs and strategies. Continued examination of important national and international issues in health promotion and disease and disability prevention that compliment those raised in AH 6324. Students will critically analyze the health promotion and disease and disability prevention scientific literature relating to a critical issue of their choice. The format for this critique will be a seminar presentation and a written scientific synthesis.

#### **6493. Occupational and Environmental Health: Exposures, Risk and Prevention**

Three credits.

Exposure pathways, risk analysis techniques and prevention strategies relevant to both occupational and environmental settings. Lectures reinforced by discussion of case studies presented by students.

#### **6495. Independent Study of Special Topics in Advanced Public Health Sciences**

Variable (1-9) credits. Prerequisite: Instructor consent.

A doctoral-level independent study course for Ph.D. students who wish to pursue special topics in advanced public health sciences under faculty supervision.

### **Public Policy (PP)**

#### **5300. Independent Study**

Variable (1-6) credits. May be repeated for credit.

#### **5301. Special Readings in Public Policy**

Variable (1-6) credits. May be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

#### **5303. Race and Public Policy**

Three credits.

Introduction to the public policy process using the salient, crossing-cutting cleavage of race.

#### **5314. Causal Program Evaluation**

(Also offered as ECON 5314.) Three credits.

Survey of the statistical methods and tools commonly used to evaluate causal claims about the impact of public policies and programs. This course is a required Master of Public Policy course.

#### **5315. Capstone in Public Administration I**

Three credits. Prerequisite: PP 5370 and 5340; open only to MPA students.

Development of project management skills and the research question, bibliography, and methodology for the capstone project. Open only to students in the Master of Public Administration Program.

#### **5316. Capstone in Public Administration II**

Three credits. Prerequisite: PP 5315.

Research and writing of the capstone project.

#### **5317. Capital Financing and Budgeting**

Three credits.

Examination of the municipal bond market, capital budgeting techniques, and related public policy issues.

#### **5318. Financial Management for Public Organizations**

Three credits.

Management of financial resources in public organizations. Topics include variance analysis, public sector accounting, financial statement analysis, and forecasting.

#### **5319. Program Development and Evaluation**

Three credits.

Techniques for evaluating and improving organizational performance and the ability to deal with the challenges posed by changing environments. Topics include strategic planning, program development, program implementation,

evaluating effectiveness, and performance measurement and improvement.

### 5320. Ethics in Policy and Management

Three credits.

Ethics in public policy and management, including contemporary ethical dilemmas and decision-making tools and techniques.

### 5321. State and Local Fiscal Problems

Three credits.

Analytical tools and concepts to evaluate policies related to government revenues, the delivery of public services, and intergovernmental relations.

### 5322. Evaluating Public Programs

Three credits. Prerequisite: PP 5376.

The tools and concepts important to evaluation research.

### 5323. Leading and Governing Nonprofit Organizations

Three credits.

The theory and practice of effective leadership and governance of nonprofit organizations.

### 5324. Grant Writing and Fund Development for Nonprofit Organizations

Three credits.

Core fundamentals of fund development and grant writing practices for nonprofit organizations.

### 5325. Labor-Management Relations, Negotiation, and Contract Management.

Three credits.

Overview of the fundamentals associated with collective bargaining in the public sector.

### 5326. Public Investment Management

Three credits.

Key dimensions of investment decision making in government, including portfolio analysis and understanding of appropriate investment instruments.

### 5327. Analysis for Management Decision Making

Three credits.

Analytic approaches to decision making in a public management environment.

### 5328. Business Functions of Nonprofit Organizations

Three credits.

Management of financial resources in nonprofit organizations. Topics include variance analysis, nonprofit accounting, financial statement analysis, internal controls, cash management and forecasting.

### 5330. The Practice of Survey Research

Six credits. May be repeated for a total of 12 credits.

The practice and use of survey research in the United States and throughout the world. The structure, culture and professional norms of the survey community. The role of public opinion polling in government and public policy-making.

### 5331. Quantitative Methods for Public Policy

Three credits.

Quantitative tools necessary to manage and evaluate public programs.

### 5332. Advanced Quantitative Methods

Three credits.

Advanced statistics for survey research analysis.

### 5333. Principles and Methods of Survey Research II

Three credits.

Advanced theory and statistics for survey research.

### 5337. Economics of Education Reform

(Also offered as EDLR 6322.) Three credits. Prerequisite: Instructor consent.

Examination of a number of prominent education reform strategies, using economics as a lens through which to understand the motivations for and potential impacts of each. Focuses on the incentives created by these policies, allowing us to predict their intended and unintended consequences. We will utilize this framework throughout as we read about and evaluate the effectiveness of various educational interventions and policy reforms. Topics include class size reduction, teacher quality and teacher certification, merit pay, school accountability, school choice, school finance reform, early childhood education, and topics in higher education.

### 5340. Introduction to Public Policy and Management

Three credits. Prerequisite: Open only to MPA and MPP students.

Introduction to the fundamentals of public policy and public management in the United States with a focus on developing the communication skills required in a professional workplace.

### 5341. Public Opinion and Democratic Processes

Three credits.

American public opinion in the context of democratic theory.

### 5342. Policy Analysis

Three credits.

Approaches and techniques used to evaluate public programs and public policy.

### 5344. Social Policy

Three credits.

Examination of the concepts and principles of public policy analysis, with applications to important social issues.

### 5345. Project Management in the Public Sector

Three credits.

Theory and techniques for successful management of public sector projects. This is a required MPA course.

### 5347. Applied Policy Issues

Three credits.

Overview of important policy issues in the United States and integrates a variety of analytical techniques used in the evaluation of public policies.

### 5361. Theory and Management of Public Organizations

Three credits.

Core management and behavioral concepts to effectively lead a public organization. Topics include leadership, strategic planning, managing organizational performance, and organizational structure, culture and politics.

### 5362. Applied Management Project

Three credits. Prerequisite: PP 5370; open only to MPA students.

Application of management concepts and theory, research and practice to problems facing public and nonprofit organizations.

### 5363. Administrative Functions of Local Government

Three credits.

An examination of the characteristic managerial problems of the several functions of local government such as police, fire, traffic, public works, parks, health, recreation. Designed for individuals planning to work with citizen agencies, in agencies for governmental management, or in journalism.

### 5364. Public Finance and Budgeting

Three credits.

Techniques, practice, and organization of financial functions in governmental organizations, including revenue analysis, budgeting skills, and financial statement analysis.

### 5365. Human Resource Management

Three credits.

The structures, processes, and principles of human resource management and labor-management relations in the public service, and examination of contemporary human resource policies and challenges.

### 5370. Applied Research Design

Three credits.

Research design for organizational management and policy analysis and evaluation. How to communicate, execute and evaluate research. Skills in selecting appropriate analytic procedures and properly interpreting and reporting results.

### 5372. Capstone Portfolio

One credit. Prerequisite: Open only to MPA and MPP students. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Provides a synthesis of basic skills and competencies important for future professionals in the public service. This is a required MPA and MPP course.

### 5373. Budgeting in Public Service Organizations

Three credits.

Processes and techniques of public budgeting; the principles and roles of budgets in public service organizations; analytic tools, concepts, and principles of budget analysis and decision making.

### 5375. Economic Analysis for Public Policy and Management

Three credits.

Application of basic microeconomic analysis to public policy and management problems. Required for the MPA and MPP programs

### 5376. Applied Quantitative Methods

Three credits. Prerequisite: Open only to students in the Master of Public Administration or the M.A. in Survey Research programs.

Statistical reasoning, tools, and techniques for effective public management.

### 5377. Qualitative Methods in Public Policy

Three credits.

Development and design of qualitative research.

**5378. Methods of Survey Data Collection**

Three credits. Recommended preparation: PP 5379.

An exploration of project management techniques applied to survey research projects.

**5379. Principles and Methods of Survey Research**

Three credits.

Exploration of the theory and practice of survey research, including sampling, questionnaire design, analysis and reporting results.

**5382. Project Management in Survey Research**

Three credits. Recommended preparation: PP 5379.

This course will explore the application of project management techniques to the management of survey research projects.

**5383. Advanced Questionnaire Design**

Three credits. Prerequisite: PP 5379.

The art and science of designing survey questionnaires. Psychological and social processes that may influence the survey response in unanticipated ways.

**5384. Political Polling**

Three credits.

The role of opinion polling in American political campaigns, journalism, and academic research, as well as the methodological aspects of scientific opinion polling.

**5385. Attitude Formation**

Three credits.

Theories of attitude formation and attitude change.

**5386. Survey Research Analysis and Reporting**

Three credits. Prerequisite: PP 5376. Recommended preparation: PP 5379.

Analytic writing skills that apply specifically to preparing survey research reports.

**5387. Surveys for Market Research**

Three credits. Recommended preparation: PP 5379.

An exploration of how survey research techniques and methods are used to address market research problems.

**5390. Supervised Internship**

Variable (3-9) credits. Prerequisite: Open only to students in the Master of Public Administration or the M.A. in Survey Research programs. May be repeated for 36 credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Experience in a public organization under competent supervision.

**5397. Special Topics in Public Policy**

Variable (1-6) credits. May be repeated for credit.

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**Romance Language (ROML)**


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**5395. Applied Linguistics for Teachers of Romance Languages**

Three credits.

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**Social Work (SSW)**


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**6400. Social Work Doctoral Program Independent Study**

Three credits. Prerequisite: Open only to Social Work Ph.D. students. May be repeated once for credit.

Special Social Work topics not included in the Social Work Doctoral Program curriculum may be the subject of an Independent Study. A proposal must be presented and approved by the Student's advisor and Doctoral Director.

**6410. Research I: Research Design and Knowledge Generation**

Three credits. Prerequisite: Open only to Social Work doctoral students, others with consent.

Logic and methods of scientific inquiry in the social sciences, with specific emphasis on issues relevant to social work research and practice. Philosophical assumptions, historical and cultural contexts, and ethical dilemmas that drive and inform the selection, structure and application of alternative research designs. Experimental, quasi-experimental and non-experimental design options will be considered. Inductive and deductive processes, hypothesis testing, probability and sampling, and analytic procedures appropriate to the different design options will be examined. Attention to using research to promote human rights and social justice will be explored.

**6411. Research II: Survey Research Methods**

Three credits. Prerequisite: SSW 6410; open only to Social Work doctoral students, others with consent.

Builds upon the foundation laid by SSW 6410; particularly by looking at the ways that survey design and survey data collection support the development of quasi-experimental research designs. Provides the skills necessary to conduct self-administered surveys to meet the goals of social work practice and research. Surveys as tools for assessing needs, monitoring program activities, measuring outcomes, and assessing attitudes. Students will learn about automated software tools for survey construction such as Qualtrics and Survey Monkey. In-depth exploration of the techniques of program evaluation and explores the role of survey research in program evaluation design and implementation.

**6412. Research III: Multivariate Statistics I**

Three credits. Prerequisite or corequisite: SSW 6410; open only to Social Work doctoral students, others with consent.

Builds upon an introductory level of statistical knowledge and assumes that you have completed an introductory statistics course, including experiences with data analyses that involve computer interactions (SPSS). Develops an understanding of the general linear model (GLM). Once students gain a solid understanding of GLM, students can extend their knowledge to a variety of more complex statistical tests. Selection and application of appropriate statistical procedures to answer research questions or test hypotheses in social work research, and involves the extensive use of available statistical packages. While the course emphasizes the understanding of statistical testing, interpretation and written presentation of statistical results, knowledge of the mathematical

formulae and assumptions underlying each statistical procedure may be required and are discussed in class. Equivalent courses offered by other UConn schools may be substituted with advisor approval.

**6413. Research IV: Multivariate Statistics II**

Three credits. Prerequisite: SSW 6412; open only to Social Work doctoral students, others with consent.

Building upon SSW 6412, focuses on the selection and application of appropriate statistical procedures to answer research questions or test hypotheses in social work research. Data reduction methods and analyses of discrete or categorical data and involves the extensive use of available statistical packages. While the course emphasizes the understanding of statistical testing, interpretation and written presentation of statistical results, knowledge of the mathematical formulae and assumptions underlying each statistical procedure may be required, and these are discussed in class. Equivalent courses offered by other UConn schools may be substituted with advisor approval.

**6414. Research V: Qualitative Research Methods**

Three credits. Prerequisite: SSW 6410; SSW 6411, which may be taken concurrently; open only to Social Work doctoral students, others with consent.

Philosophical underpinnings, history, techniques and relevance to social work research of qualitative inquiry traditions such as biography, phenomenology, grounded theory, ethnography and case study methods. Although many of these techniques are also useful in social work practice, this course will focus on the use of qualitative methods for the purpose of expansion of the knowledge base of the profession. As such the course will emphasize techniques, standards of quality, verification, and other indicators of rigor as well as value an ethical issues. After completing this course students will be able to describe various approaches, set up research protocols, utilize qualitative data analysis software (e.g. NVivo), describe quality control techniques and specify standards for report writing.

**6420. Critical Analysis of Historical and Philosophical Themes of the Profession**

Three credits. Prerequisite: Open only to Social Work doctoral students, others with consent.

Develops critical and historical understanding of social work knowledge, values and interventions. Social, economic, political and intellectual forces that influence the development of social welfare and professional social work. The role that conflicting ideologies and commitments in alleviating stress and suffering. Development and history of social work in the context of changing social, economic, political and intellectual environments.

**6435. Social and Behavioral Science: The Knowledge Base for SW Practice with Smaller Target Systems**

Three credits. Prerequisite: Open only to Social Work doctoral students, others with consent.

Theoretical and empirical frameworks about human behavior and the social environment upon which contemporary best practices are built. The theories and frameworks examined include cognitive, behavioral/social learning, psychodynamic, family systems and other related

concepts. Other theories that demonstrate a valid underpinning of effective or promising social work practice may be added.

**6436. Comparative Social Work Practice Models (Micro Practice)**

Three credits. Prerequisite: SSW 6435; open only to Social Work doctoral students, others with consent.

Major past and present social casework and group work practice models from historical, theoretical and empirical perspectives. Current practice approaches/models from related fields empirically shown to be most effective or promising are examined. Selected social work models are examined within the social, political and ideological contexts of their times as well as with respect to their contributions to the profession's knowledge base. Each model's contribution to the profession's knowledge base and to direct practice methods are investigated and related to students' conceptual and practice experiences.

**6445. Social and Behavioral Science: Knowledge Base for Practice with Large Target Systems**

Three credits. Prerequisite: Open only to Social Work doctoral students, others with consent.

Conveys substantive knowledge from social science disciplines that inform macro practice with large systems and fields of macro practice (community organization, administration and policy practice). It is expected that students demonstrate competence in understanding the development and application of major social science theoretical models relevant to macro practice and with the empirical evidence that supports these theories. Ethical implications for social work of knowledge developed by disciplines with different value bases are considered.

**6446. Comparative Social Work Practice Models (Macro Practice)**

Three credits. Prerequisite: SSW 6445; open only to Social Work doctoral students, others with consent.

The evolution and development of macro practice in the United States with an emphasis on the use of methods of community organization and policy practice in social work. These distinct methods, as well as different practice models associated with them, will be considered in the context of the social work profession and practice. A conceptual history of macro practice within social work, including the unique role of macro practice methods in carrying out the mission of the social work profession. Attention is given to how different social, economic, and political theories have influenced macro practice. Particular emphasis is placed on the impact of macro practice on historically marginalized and oppressed groups and in addressing social problems.

**6451. Dissertation Preparation Seminar**

Three credits. Prerequisite: Open only to Social Work doctoral students. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The Dissertation Seminar is designed to assist students in identifying suitable dissertation topics and developing appropriate methodological approaches. The seminar provides opportunities to assist students in building a firm foundation upon which to engage in independent research

and scholarship to advance existing knowledge. Students are required to prepare papers related to their dissertation topic for presentation and discussion with the doctoral student group. Outside speakers from the UConn community are brought in to engage students on issues related to library resources, report writing, research funding support, data analysis, and the institutional review board process. The seminar will develop and strengthen students' scientific communication skills in preparation for the initiation of their dissertation proposal.

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**Social Work Elective (SWEL)**

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**5310. Services to Immigrants and Refugees and Cross-Culture Helping**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Examines and connects concepts from migration studies with social work practice knowledge. Highlights the influence of immigration policy and procedures on the lives of immigrants and on service delivery and social work practice. Examines the interrelationship between sending and receiving countries and examines the experiences of individuals in the home country with their experiences in the new country. Emphasizes cultural and cross-cultural issues in each of the migration stages. Highlights different cultural views on health, mental health, help-seeking behavior, family and child-rearing practices and gender role behavior. Elective course for Substantive Area: Focused Area of Study on International Issues in Social Work.

**5317. Women, Children, and Families: Social Policies and Programs**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Focuses on the policies and programs that affect women and children, in particular income supports, maternal and child health, housing, domestic violence, foster care and adoption, and parenting and child maltreatment. Special attention will be paid to the legal rights of women and children, especially those who are immigrants, have disabilities, or are members of minority groups. Required course for Substantive Area: Focused Area of Study on Social Work with Women and Children in Families.

**5318. Core Concepts of Child and Adolescent Trauma**

Three credits. Prerequisite: Open to Social Work M.S.W. and non-degree students.

Incorporates the new National Child Traumatic Stress Network core curriculum on child trauma (CCCT). The course conveys the crucial evidence-based concepts, components, and skills designed by the NCTSN to strengthen competency in assessment, referral, and treatment.

**5321. Social Work Perspectives on Adoption**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Focuses on new developments in adoption and the knowledge, values and skills needed by social workers to effectively plan and deliver adoption services to a diverse group of children and families. Elective course for Substantive Area: Focused

Area of Study on Social Work with Women and Children in Families.

**5333. Travel Study for Social Work**

Variable (1-3) credits. Prerequisite: Open only to students in the M.S.W. or STEP program; instructor consent.

Combines academic study with travel to examine social work and social welfare in other systems. Addresses the impact of social, economic and political systems on social welfare and social work; a cross-national examination of the profession; and cross-cultural understanding. Elective course for Substantive Area: Focused Area of Study on Puerto Rican/Latino/a Studies Social Work; Elective course for Substantive Area: Focused Area of Study on International Issues in Social Work.

**5345. International Development: Theory and Practice**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

International relief, reconstruction and development -- theories and practice strategies to attack poverty and improve human well-being. Among the topics covered will be: building local capacity, developing local partnerships, use of appropriate technology to create sustainability, multi-sectoral work, cultural relevance, ensuring gender sensitive programming, understanding and working with local and national structures, funding streams, and international partnerships. Elective course for Substantive Area: Focused Area of Study on International Social Work.

**5348. International Social Work Global Issues**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Cross-national, comparative approach to selected topics in international social problems and social welfare. Consideration of the problem of developing nations and modernization and urbanization as worldwide processes; the role of international organizations; the role of social work in international issues; and the implications of cross-national study for practice. Required course for Substantive Area: Focused Area of Study on International Issues in Social Work; Elective course for Substantive Area: Focused Area of Study on Urban Issues in Social Work.

**5350. Comparative Social Welfare Policy between the U.S. and the Second World**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Evolution and current state of development of social welfare in the "Second World," a designation that applies to those countries that were part of the Soviet Union or Warsaw Pact. Discussion of a framework for policy analysis and comparative international social welfare policy analysis using selected health, welfare and employment policies as illustrations of current social welfare policy in Armenia and other "Second World" countries. Course will be jointly taught by Dr. Nancy A. Humphreys and Dr. Ludmilla Haroutunian involving a group of UConn M.S.W. students and Armenian graduate students using WebCT technology. Elective course for Substantive Area: Focused Area of Study in International Social Work.

**5351. Policy Issues in Aging**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

History, development, and ramifications of social, economic and political policy issues relevant to the elderly; the elderly as voters and political actors. Major attention to framework for policy analysis. Elective course for Substantive Area: Focused Area of Study on Social Work Practice with Older Adults.

**5360. Economic Justice: Labor and Social Work**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

The relationship of social work and the labor movement with particular attention to the labor movement under new leadership and with new direction. Organized around four themes: 1) Common roots of labor and social work, 2) Social workers as union members, 3) Social workers as union organizers and 4) The labor movement as a social movement.

**5371. Permanent Families for Children**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Permanency planning as a framework for social work practice in child welfare. Examines the philosophy, theory, and methodology of permanency planning for children and youth placed, or at risk of placement, out of their homes. Programs, skills, and strategies for preventing placement, reuniting placed children with their biological families, or developing other permanent families, particularly through adoption. Elective course for Substantive Area: Focused Area of Study on Social Work with Women and Children in Families.

**5375. War, Militarism and Social Work**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Theoretical and empirical content on several linked global phenomenon -- imperialism, militarism, and war -- to understand their impact on U.S. and global society. Analysis of "globalization," its relationship to war and militarism, and why this process is relevant to social work practice. Political forces in the United States that support and benefit from militarism to illustrate their effects on social policy and the social work profession. Arguments for and against a dominant and aggressive U.S. role in global affairs will be examined. The adverse impact upon the welfare state and oppressed populations.

**5377. Urban Policy Issues**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Urban problems and policy issues as well as social work practice issues in urban settings. Connecticut cities are used to explore the effectiveness of current policies and consider the need for policy change. Current social and economic needs of urban populations and the political environment are also considered. Required course for Substantive Area: Focused Area of Study on Urban Issues in Social Work; Elective course for Substantive Area: Focused Area of Study on International Issues in Social Work.

**5380. Political Social Work**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program. May be repeated once for credit.

Exploration of the world of elected politics as a legitimate field of social work practice. Social workers are currently playing many roles in this area including, serving as volunteer and paid staff in political campaigns at the local, state and federal level; as paid staff of elected politicians; in politically appointed positions; and as elected politicians. Practical realities of each of these positions. Students are required to attend the annual Campaign School sponsored by the Institute for the Advancement of Political Social Work Practice. Elective course for Substantive Area: Focused Area of Study on Urban Issues in Social Work.

**5385. Human Rights and Social Work**

Three credits. Prerequisite: Open only to students in the M.S.W. or STEP program.

Theoretical, conceptual, and practical foundation for social workers to engage in a human rights-based approach to social work. Students will gain an understanding of the international human rights system, social work's contribution to achieving human rights, and how international human rights principles can be applied to social work practice. We will use a number of cases from varied countries, including the United States, to examine how social workers can both advocate for and respect human rights in their work.

**5386. Transitioning Youth at Risk**

Variable (1-3) credits.

Designed to be taken concurrently with the Department of Mental Health and Addiction Services (DHMAS) field placement internship. It is a requirement for the DHMAS cohort, and is limited to this designated group. It is a two semester seminar, which meets on an every other week basis. Students will receive a grade at the end of each semester. Provides an overview and critical analysis of theories of young adult development, the recovery model as it is practiced in Connecticut, the impact of major mental illness on psychosocial functioning in the community, and effective social work interventions.

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**Social Work Research (RSCH)**

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**5340. Social Work Research Evaluation with Macro and Micro Systems**

Two credits. Prerequisite: BASC 5333 or Advanced Standing; open only to Social Work M.S.W. students.

Focuses on the development of knowledge, attitudes and skills appropriate to the ongoing critical evaluation of social work practice with small and large systems from diverse populations. Prepares students to integrate evaluation methods into assessment, planning, intervention and evaluation of their professional social work practice. Provides students with the knowledge to develop skills for evaluating practice through the use of evaluation designs appropriate for use in micro and macro level practice.

**5341. Advance Research: Program Evaluation**

Three credits. Prerequisite: BASC 5333 or Advanced Standing; open to Social Work M.S.W. students.

Development of knowledge, attitudes and skills appropriate to the ongoing critical evaluation of social work practice with systems from diverse populations. Social workers have a responsibility to evaluate their individual practice effectiveness and the effectiveness of interventions used with clients in accord with both the ethical standards articulated in the NASW Code of Ethics as well as the accountability standards required by agencies and other funding sources. Prepares students to integrate evaluation methods into assessment, planning, intervention and evaluation of their professional social work practice. Provides students with the knowledge to develop skills for evaluating practice through the use of evaluation designs. Students will learn to employ these designs and to analyze the data drawn from these designs in order to inform professional practice decision-making.

**5342. Advanced Research Topics: Variable Topics**

Three credits. Prerequisite: BASC 5333 or Advanced Standing; open to Social Work M.S.W. students.

Variable topics in research methodology that provides advanced skills and knowledge for social work practice. Course topics could include applied qualitative research, participatory action research, historical methods, and statistics in social work research.

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**Social Work Special Topics (SPTP)**

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**5318. Special Topics**

Variable (1-3) credits. Prerequisite: Open only to M.S.W. students. May be repeated for a maximum of 12 credits.

Introduces new and innovative material into the curriculum on an experimental basis. Any special topics course may be offered only twice and may not duplicate content already available in the regular curriculum. Any instructor offering a special topics course must submit the title and a brief statement of focus of the course to the Registrar for inclusion in the course registration schedule. A student may apply up to eight credits of Independent Study and Special Topics in Social Work (combined) toward the M.S.W. degree.

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**Sociology (SOCl)**

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**5001. Proseminar**

One credit. Prerequisite: Instructor consent. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Required of all M.A. candidates in the first year of study. Covers issues of successful graduate education and professionalization, including transitioning from the role of student to scholar; mentoring; networking; choosing thesis topics; presenting papers at conferences; getting papers published; getting grants; and developing vitae.

**5003. Teaching Sociology**

Variable (1-3) credits. Prerequisite: open only to Sociology graduate students.

A survey and discussion of the content, viewpoints and methods that can be employed in teaching sociology. Emphasis is on course preparation for new teachers.

**5201. The Logic of Social Research**

Three credits.

Required of all M.A. candidates in the first year of study. Covers the logic of how to frame and design social research. Topics include the link between theory and method, selection of a research topic, inductive versus deductive reasoning, causality (including research designs for identifying causal relations) and causal errors, conceptualization, operationalization, levels of analysis, measurement, reliability and validity, sampling, using mixed methods, research ethics, and the politics of social research.

**5203. Quantitative Research I**

Three credits. Prerequisite: SOCI 5201; instructor consent.

Required of all M.A. candidates in the first year of study. Introduction to quantitative methods of social research. Topics include linear regression, including ANOVA and ANCOVA; hypothesis testing and model selection; regression diagnostics; non-linearity and functional form; path analysis; and factor analysis.

**5205. Topics in Quantitative Methods**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Special topics in quantitative methods in sociological research. Topics will vary by semester.

**5210. Applied Survey Design and Analysis**

Three credits. Prerequisite: SOCI 5203; instructor consent required.

The design, administration, and analysis of sample surveys.

**5231. Qualitative Research I**

Three credits. Prerequisite: open only to Sociology graduate students; instructor consent.

Introduction to qualitative methods of social research. Topics include epistemologies of qualitative methodologies; ethical issues in qualitative research; the Chicago School; symbolic interactionism and grounded theory; introduction to fieldwork; basic fieldwork techniques; interviewing; narrative analysis; textual analysis; data analysis; content analysis using computers; and writing analyses of data.

**5235. Topics in Qualitative Methods**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Special topics in qualitative methods in sociological research. Topics will vary by semester.

**5251. Core Theorists**

Three credits. Prerequisite: Instructor consent.

An examination of the original writings of the major figures in sociological theory: Durkheim, Marx, Weber, and Simmel. The course focuses upon the theories of these major figures, their relations with contemporaries, their interconnections, and their influence upon subsequent theory and theory groupings.

**5255. Topics in Sociological Theory**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Special topics in sociological theory. Topics will vary by semester.

**5275. Topics in Culture**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Special topics in sociological theory and research in culture. Topics will vary by semester.

**5315. Topics in Deviance and Crime**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Special topics in sociological theory and research in deviance and crime. Topics will vary by semester.

**5401. Analysis of Social Organization**

Three credits. Prerequisite: Instructor consent.

An examination of patterns of social organization found in bureaucracies and voluntary associations.

**5411. Sociology of Work**

Three credits. Prerequisite: Instructor consent.

Analysis of work behavior with particular attention to formal and informal organization of labor, white collar, executive and professional roles.

**5421. Seminar in Social Stratification**

Three credits. Prerequisite: Instructor consent.

Social class theories, and problems of distribution of power and privileges. Some attention will be given to a comparative analysis of class systems.

**5425. Topics in Stratification and Inequality**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Special topics in sociological theory and research in social stratification and inequality. Topics will vary by semester.

**5471. Energy, Environment, and Society**

Three credits.

Sociological perspectives on energy production, distribution and consumption; environmental impacts and constraints; alternative energy and environment futures; and cross-national studies of policy formation and implementation.

**5501. Racism**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Variable topics in the study of racism, such as racism and U.S. social policy, white racism, and the social construction of whiteness. Topic may vary by semester.

**5505. Topics in Racism and Ethnic Group Relations**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Special topics in sociological analyses of racism and ethnic group relations. Topics will vary by semester.

**5515. Sociology of Immigration**

Three credits. Prerequisite: Instructor consent.

Theoretical and empirical work on immigration and ethnicity including forms of assimilation, ethnicity and transnationalism; challenges and opportunities for incorporation, and struggles over political, social, economic human rights. The course focuses on the US with selected cases from Europe and Asia.

**5601. Gender and Society**

Three credits. May be repeated for a total of six credits.

Critical appraisal of social scientific perspectives on women and men. Feminist theory and current social science research on gender. Emphasis on interdisciplinary approaches.

**5605. Topics in Gender and Sexualities**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Special topics in sociological theory and research in gender and sexualities. Topics will vary by semester.

**5612. Feminist Theory and Social Science**

Three credits. Prerequisite: Instructor consent.

Examines intellectual background and contemporary context for feminist theoretical debates in the social sciences. Explores these debates with reference to feminist perspectives on political theory, science, economics, postmodernism, postcolonialism, globalization, socialization, and sexuality.

**5651. Seminar in the Family**

Three credits. Prerequisite: Instructor consent.

An analytical study of the family as a social group in terms of structure, member roles, and function with an examination of ethnic, religious, and class differences. The interrelationship between the family and its cultural context is analyzed with particular reference to the impact of modern culture.

**5701. Urban Sociology**

Three credits. Prerequisite: Instructor consent.

A survey of topics in urban sociology. Examines both classical and contemporary perspectives on the social organization of cities including urbanization, suburbanization, spatial characteristics of cities, residential segregation, immigration, poverty and wealth, and urban-based social problems.

**5703. The Metropolitan Community**

Three credits. Prerequisite: Instructor consent.

Topics in urban sociology.

**5705. The Community**

Three credits. Prerequisite: Instructor consent.

A critical analysis of current theories of the nature of the community, its types, functions, processes, agencies, and values. Emphasis is given to community surveys and community organization.

**5751. Demography**

Three credits. Prerequisite: Instructor consent.

Survey and analysis of theories and present problem areas in demography. This includes such topics as: population growth and distribution, population composition, mortality, fertility, migration, and population policy.

**5753. Methods of Population Analysis**

Three credits. Prerequisite: Instructor consent.

The sources and characteristics of demographic data and vital statistics and the methods and problems of population data analysis.

**5801. Political Sociology**

Three credits. Prerequisite: Instructor consent.

Sociological aspects of political institutions and behavior; social and economic bases of political power, ideology, and mobilization of support;

community and national power systems, political parties, and elites.

#### **5805. Topics in Political Sociology**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Special topics in sociological theory and research in political sociology. Topics will vary by semester.

#### **5806. Seminar in Theories of the State**

Three credits.

A sociological examination of theoretical analysis of the role of the state in modern society, and the relationship between the state and the applications of these theories to empirical analyses of specific research questions.

#### **5809. Inequality and the Welfare State**

Three credits. Prerequisite: Instructor consent.

Analysis of the relationship between systems of racial, class, and gender inequality, and the formation and implementation of social policy by the contemporary U.S. welfare state.

#### **5821. Social Movements**

Three credits. Prerequisite: Instructor consent.

Analysis of the conditions and processes underlying movement formation and participation and influencing their careers and outcomes.

#### **5829. Social Change**

Three credits. Prerequisite: Instructor consent.

A study of the forces prompting and impeding societal change with particular attention to those operative in contemporary society. Major theories of social change are examined.

#### **5831. Law and Society**

Three credits. Prerequisite: Instructor consent.

An overview of theoretical perspectives in the sociology of law, with emphasis on classical social theory.

#### **5833. Gender, Politics and the State**

Three credits. Prerequisite: Instructor consent.

Explores gendered construction of state and politics with attention to changes over time, across cultures and political institutions. Examines key debates within feminist political and legal theories and third world feminist and post colonialist theories of the state. Discusses links between local resistance, immigration, cultural citizenship, international politics, neoliberal discourse, and global economic restructuring.

#### **5895. Investigation of Special Topics**

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

A seminar course. Topics vary by semester.

#### **5899. Independent Study for Graduate Students**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Special topic readings or investigations.

#### **6005. Advanced Topics in Sociology**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in sociological analysis. Topics will vary by semester.

#### **6203. Quantitative Research II**

Three credits. Prerequisite: Instructor consent.

Advanced quantitative methods of social research. Topics include generalized linear models,

including binary logit and probit, multinomial logit, ordered logit and probit, and count data; censoring, truncation, and sample selection; panel data; and correlated errors.

#### **6205. Advanced Topics in Quantitative Methods**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in quantitative methods in sociological research. Topics will vary by semester.

#### **6231. Qualitative Research II**

Three credits. Prerequisite: Instructor consent.

Advanced topics in qualitative methods of social research. Topics include contemporary debates in qualitative methodology; critical perspectives on qualitative methodology; feminist research; institutional ethnography; the case method; extended case method; Third World and postcolonial approaches to social research; analyzing and reanalyzing field data; applied and evaluation research; participatory and activist research.

#### **6251. Current Theory and Research**

Three credits. Prerequisite: SOCI 5251; instructor consent.

An examination of current theories. Topics include: consideration of their continuities with classical theories, conceptual and measurement problems in testing and constructing current theories, and the interplay between theory and research.

#### **6255. Advanced Topics in Qualitative Methods**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in qualitative methods in sociological research. Topics will vary by semester.

#### **6265. Advanced Topics in Sociological Theory**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in sociological theory. Topics will vary by semester.

#### **6275. Advanced Topics in Culture**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in sociological theory and research in culture. Topics will vary by semester.

#### **6315. Advanced Topics in Deviance and Crime**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in sociological theory and research in deviance and crime. Topics will vary by semester.

#### **6355. Advanced Topics in Individuals and Society**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in sociological theory and research in the relationship between individuals and society. Topics will vary by semester.

#### **6425. Advanced Topics in Stratification and Inequality**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in sociological theory and research in social stratification and inequality. Topics will vary by semester.

#### **6505. Advanced Topics in Racism and Ethnic Group Relations**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in sociological theory and research in racism and ethnic group relations. Topics will vary by semester.

#### **6605. Advanced Topics in Gender and Sexualities**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in sociological theory and research in gender and sexualities. Topics will vary by semester.

#### **6805. Advanced Topics in Political Sociology**

Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

Advanced topics in sociological theory and research in political sociology. Topics will vary by semester.

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### **Spanish (SPAN)**

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#### **5320. Independent Study**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

#### **5323. Concepts of Literary Criticism**

Three credits.

A practical approach to the theories and methods of literary criticism with particular reference to Hispanic literature.

#### **5325. Cervantes Studies**

Three credits. May be repeated for a total of nine credits.

Don Quixote I and II and the critical corpus. The Novelas Ejemplares, Entremeses and other works.

#### **5334. Modern Spanish-American Poetry**

Three credits.

Selected poets and movements in Spanish America from the late nineteenth century to the present.

#### **5335. The Theatre in Spanish America**

Three credits.

The works of selected dramatists, with emphasis on the modern period.

#### **5336. Colonial Latin American Literature**

Three credits.

Study of particular aspects of colonial literary production: religious and secular historiography; humanist thought in the colonies, poetry, and society; literature and the Baroque city; political and scientific thought.

#### **5350. The Essay in Spanish America**

Three credits.

The Spanish-American essay as a literary genre and a vehicle of ideas. Reading in the works of the chief essayists of the Spanish-American nations.

#### **5356. Twentieth-Century Novel and Essay**

Three credits. May be repeated for a total of 12 credits.

Selected works either of authors from 1895 to 1936, or of authors from 1936 to the present.

**5359. Special Topics in Early Modern Spanish Literature**

Three credits. May be repeated for a total of nine credits.

The novel, the short story, and other prose genres in the early modern period.

**6339. Seminar on Sixteenth or Seventeenth Century Studies**

Three credits. May be repeated for a total of nine credits.

Open topics.

**6402. Studies in Spanish-American Literature**

Three credits. May be repeated for a total of nine credits.

**6403. Studies in Spanish Literature**

Three credits. May be repeated for a total of nine credits.

May be repeated for up to nine credits with a change of topic.

**6404. Special Topics in Nineteenth-Century Spanish-American Literature and Cultural Production**

Three credits. May be repeated for a total of nine credits.

Nineteenth century Spanish-American cultural production from Independence to the end of the nineteenth century. Emphasis on the interaction of literature and social thought, on the relations between literature and other forms of art, or on the role of artistic and intellectual practices in shaping the new nations.

**6405. Special Topics in Twentieth-Century Spanish-American Literature and Cultural Production**

Three credits. May be repeated for a total of nine credits.

Twentieth century Spanish-American cultural production. Emphasis on the interaction of artistic practices and social thought, or on the relations between literature, other forms of art, and social or political movements.

**6407. Special Topics in Modern Spanish Cultural Production**

Three credits. May be repeated for a total of nine credits.

Spanish culture from the Enlightenment to the present. Emphasis on the interaction of art and social thought, on the relations between art and the media, or on the role of intellectual practices in shaping or challenging notions of gender, ethnic, and national identity.

**6408. Special Topics in Nineteenth Century Spanish Literature**

Three credits. May be repeated for a total of nine credits.

Nineteenth century Spanish literature. Emphasis on the interaction of literature and social thought or the relations between literature and other forms of art.

**6416. Theoretical Debates and the Hispanic Tradition**

Three credits. May be repeated for a total of nine credits.

Aspects of methodology, theory, and history relevant to the study of cultural production in Hispanic societies.

**Speech, Language and Hearing Sciences (SLHS)****5302. Summer Clinical Practicum in Speech Disorders**

One credit.

Summer practicum in speech disorders.

**5303. Advanced Topics in Medical Speech Pathology**

Three credits. Prerequisite: SLHS 5302.

Advanced practice management in the prevention, assessment and treatment of medically based disorders in the field of Speech-Language Pathology. Integration of content from previous didactic and practicum courses applied in a lifespan approach to emphasize the role of a collaborative health care team in a multidisciplinary context.

**5321. Otologic Basis of Hearing Loss**

Three credits.

Basic and advanced principles of medical audiology including anatomy and physiology of the system, disorders of the auditory system, genetics, radiology, and functional brain imaging.

**5322. Electrophysiology Techniques and Interpretation I**

Four credits. Three class periods and one 1-hour laboratory period.

Review of clinical applications of otoacoustic emissions, auditory brainstem response, electrocochleography, and auditory steady state potentials with emphasis on diagnostic issues.

**5323. Geriatric Audiology**

Three credits.

The physical effects of aging on the auditory periphery and central nervous system, as well as the consequences of aging on diagnostic and rehabilitative services to older clients.

**5324. Psychosocial Issues of Hearing Loss**

Three credits.

Contemporary counseling issues related to working with individuals with hearing disorders. Emphasis on family systems and the impact of a hearing disorder.

**5325. Adult Aural Rehabilitation**

Three credits. Prerequisite: SLHS 5356.

The provision of aural rehabilitation services to adults with hearing loss including auditory training, speechreading, auditory-visual integration, effective communication strategies, and Deaf culture.

**5326. Professional Issues in Audiology**

Three credits.

Issues related to ethics and practice in the field of audiology, multicultural sensitivity, legal rights and responsibilities.

**5327. Introduction to Clinical Topics in Audiology**

Three credits. May be repeated for credit with a change in topic.

Provides mandated training required prior to any interaction with patients during clinical observations and supports early experiences once clinical practicum has begun. Students will demonstrate understanding and practice of evaluation protocols, professionalism,

documentation and interpersonal communication required prior to practicum.

**5328. Intermediate Clinical Topics in Audiology**

Three credits. May be repeated for credit with a change in topic.

Intermediate-level topics in providing clinical audiology services with a focus on prevention and intervention; supports ongoing clinical practicum.

**5329. Advanced Clinical Topics in Audiology**

Three Credits. May be repeated for credit with a change in topic.

Integrating advanced diagnostic and treatment topics with evidence-based practice through presentations and case studies.

**5335. Fluency Disorders**

Three credits.

Research data and theoretical models regarding the etiology and characteristics of fluency disorders (primarily stuttering) are integrated to form the foundation for clinical management. Treatment approaches for children and adults are presented.

**5336. Clinical Practicum in Speech Disorders**

Three credits. May be repeated for credit.

**5337. Clinical Practicum in Hearing**

Variable (1-6) credits. Discussion. May be repeated for credit.

**5342. Aphasia**

Three credits.

The differential diagnosis of acquired neurogenic communication disorders as well as research, theory, and efficacy of language interventions for aphasia in adults.

**5343. Cognitive-Communicative Disorders**

Three credits.

Cognitive-communicative disorders in adults secondary to right hemisphere damage, traumatic brain injury, and dementia. Emphasis on differential diagnosis and theories and research pertaining to clinical management including the efficacy of interventions.

**5344. Pediatric Rehabilitative Audiology**

Three credits.

Auditory-based components of managing hearing loss in children; the role of the family and cultural environment in service delivery.

**5345. Motor Speech Disorders**

Three credits.

The effects of acquired and developmental neuropathology on speech. Emphasis on differential diagnosis and clinical management.

**5346. Dysphagia**

Variable (1-3) credits.

Dysphagia secondary to neurologic impairments, cancer, and degenerative disease. Anatomy and physiology of normal and disordered swallowing, evaluation including instrumental assessment techniques, and multidisciplinary management.

**5348. Language Disorders I: Birth to 5 Years**

Three credits.

The nature, assessment, and intervention of delayed and disordered language in children birth to five years of age.

**5349. Language Disorders II: School Age Population**

Three credits.

The nature, assessment, and intervention of delayed and disordered language in school-age children.

**5351. Amplification for Residual Hearing**

Three credits.

Introduction to hearing aids and assessment of the personal amplification needs of hearing-impaired individuals.

**5353. Speech Sound Disorders in Children**

Three credits.

Prevention, assessment, and intervention of anatomical, physiological, and language-based disorders affecting the production of speech in children.

**5355. Psychoacoustics**

Three credits.

Basic principles of human perception of sound.

**5356. Audiological Assessment**

Three credits.

The development and administration of advanced pure-tone and auditory discrimination tests; the interpretation of audiometric findings for adults and children.

**5359. Voice Disorders**

Three credits.

Normal anatomy and physiology of voice production including the effects of: aging across the lifespan, gender, and multicultural issues. Voice disorders, diagnostic procedures and management techniques to remediate voice disorders will be discussed.

**5361. Advanced Speech Science I**

Three credits.

Generation, transmission, detection, and analysis of the speech signal. Special attention is given the myology of speech production and the physiological correlates of the acoustic output. Theoretical models of speech production are examined in light of recent empirical findings. Biomedical and other research techniques are employed in the laboratory setting to investigate the speech communication processes.

**5362. Advanced Speech Science II**

Three credits. Prerequisite: SLHS 5361.

A continuation of SLHS 5361.

**5372. Central Auditory Disorders**

Three credits.

Assessment of auditory processing in adults and children. Effects of processing problems on communication and a discussion of management techniques. Electrophysiological measurement techniques are stressed.

**5373. Pediatric Audiology**

Three credits.

Physiological and perceptual maturation of the auditory system from gestation through two years of age. Assessment of children's hearing, including difficult to test children, public school and neonatal screening.

**5374. Clinical Project in Speech-Language Pathology**

Three credits.

Written report and oral presentation on a client's clinical intervention. The clinical project must be successfully completed to graduate with an M.A. in speech-language pathology via the non-thesis track.

**5375. Auditory System: Anatomy and Physiology**

Three credits. Prerequisite: Instructor consent.

Review of the structure and function of the human auditory system, with emphasis on the clinical/applied aspects of anatomy and physiology. Oriented towards relationships to various auditory disorders.

**5376. Language Impairments and Literacy**

Three credits. Prerequisite: Instructor consent.

A research seminar covering the theories, assessment, and treatment of children with reading disabilities from a language-based perspective. Open to graduate students in Communication Disorders, others with permission. Recommended preparation: a course in normal language development and language disorders in preschool and school-age children.

**5377. Introduction to Research**

Three credits. Prerequisite: Instructor consent.

Introduction to research, experimental design, and statistics. Includes ethics in research, publishing, grant writing, general research skills, and computerized statistics. Open to graduate students in Communication Disorders, others with permission.

**5378. Augmentative Alternative Communication in Speech-Language Pathology**

Three credits. Prerequisite: Open only to second-year Speech, Language and Hearing Sciences M.A. students, others with consent.

Principles of assessment, therapeutic intervention and diagnostic selection of no-, low-, mid- and/or high-technology Augmentative Alternative Communication for individuals with complex communication needs.

**5379. Introduction to Medical Speech Pathology 1**

One credit. Intended for first year graduate students enrolled in the SLHS M.A. program.

Lectures and clinical rotations at UConn Health to prepare students for their off-campus medical practicum.

**5380. Introduction to Medical Speech Pathology II**

One credit. Prerequisite: SLHS 5379. Intended for first year graduate students enrolled in the SLHS M.A. program.

Lectures and clinical rotations at the UConn Voice Clinic, to prepare students for their off-campus medical practicum.

**5385. Advanced Topics in Medical Speech Pathology**

Three credits. Prerequisite: SLHS 5302.

Advanced practice management in the prevention, assessment and treatment of medically based disorders in the field of Speech-Language Pathology. Integration of content from previous didactic and practicum courses applied in a lifespan approach to emphasize the role of a collaborative health care team in a multidisciplinary context.

**5400. Cochlear Implants**

Three credits. Prerequisite: Open only to Doctor of Audiology students; others with instructor consent.

Cochlear implants and their function, patient performance, clinical programming software and techniques, current research, and future technology.

**5401. Research Methods in Audiology**

Three credits. Prerequisite: Open only to Doctor of Audiology students; others with instructor consent.

Vocabulary and foundational concepts for research; conceptual framework to design research, critically evaluate research, write research proposal, participate in peer review process, and complete IRB application.

**6123. Bilingualism in Typical and Atypical Populations: Language and Cognition**

Three credits. Prerequisite: Instructor consent. Recommended preparation: a course in phonetics, language development and disorders.

Biological and cognitive factors associated with language acquisition, cognitive reserve, Specific Language Impairment in bilinguals. Emphasis on diagnosis, cognitive factors in language selection, and differences in reading opaque vs. transparent languages.

**6300. Independent Study in Communication Disorders**

Variable (1-6) credits. May be repeated credit.

Periodic conferences with the instructor are required.

**6319. Practicum in Research**

Variable (1-6) credits. May be repeated for credit.

Practicum. May be repeated for credit.

**6366. Seminar in Hearing Science**

Variable (1-6) credits. Seminar. May be repeated for credit with a change in content.

**6367. Topics in Hearing and Speech Science**

Variable (1-3) credits. Lecture. May be repeated for credit with a change in content.

**6368. Topics in Speech Pathology**

Variable (1-3) credits. Lecture. May be repeated for credit with a change in content.

**6369. Topics in Audiology**

Variable (1-3) credits. Lecture. May be repeated for credit with a change in content.

**6401. Amplification of Residual Hearing II**

Three credits. Prerequisite: SLHS 5351.

Theoretical and clinical issues related to hearing aid candidacy and fitting with an emphasis on advanced signal-processing strategies.

**6402. Hearing Conservation / Industrial Audiology**

Three credits.

Effects of noise on the structure and function of the auditory system. Elements of noise measurements, otoprotection, and key issues in establishment and maintenance of a hearing conservation program.

**6410. Vestibular System: Clinical Aspects**

Four credits. Prerequisite: Open only to graduate students in Audiology; instructor consent required.

Anatomy, physiology and functional assessment of the vestibular system including instrumentation, procedures, and interpretation of clinical tests. Hands-on laboratory exercises included.

**6422. Electrophysiologic Techniques and Interpretation II**

Four credits. Prerequisite: SLHS 5322.

Methods of acquiring, averaging and analyzing cortical evoked and event-related potentials following auditory input. Emphasis on utilization of multi-channel recording devices for research and clinical purposes.

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## Statistics (STAT)

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**5005. Introduction to Applied Statistics**

Three credits. Not open for credit to students who have passed STAT 2215Q.

One-, two- and k-sample problems, regression, elementary factorial and repeated measures designs, covariance. Use of computer packages, e.g., SAS and MINITAB.

**5099. Investigation of Special Topics**

(Also offered as BIST 5099.) Variable (1-6) credits. Prerequisite: Open only to Statistics graduate students; instructor consent. May be repeated for credit.

**5105. Quantitative Methods in the Behavioral Sciences**

Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Acquaints the student with the application of statistical methods in the behavioral sciences. Correlational methods include multiple regression and related multivariate techniques.

**5192. Supervised Research in Statistics**

Variable (1-6) credits. Prerequisite: Open only to Statistics graduate students, others with consent.

**5215. Statistical Consulting**

(Also offered as BIST 5215.) Three credits. Prerequisite: STAT 5315, 5505, 5605 and 5725; or instructor consent.

Applied inference for academia, government, and industry: ethical guidelines, observational studies, surveys, clinical trials, designed experiments, data management, aspects of verbal and written communication, case studies.

**5225. Data Management and Programming in R and SAS**

(Also offered as BIST 5225.) Three credits. Prerequisite: STAT 5505 and 5605; or instructor consent.

Creation and management of datasets for statistical analysis: software tools and databases, user-defined functions, importing/exporting/manipulation of data, conditional and iterative processing, generation of reports.

**5315. Analysis of Experiments**

Three credits. Prerequisite: STAT 5005. Not open for credit to students who have passed STAT 3115Q.

Straight-line regression, multiple regression, regression diagnostics, transformations, dummy variables, one-way and two-way analysis of variance, analysis of covariance, stepwise regression.

**5361. Statistical Computing**

(Also offered as BIST 5361.) Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Use of computing for statistical problems; obtaining features of distributions, fitting models and implementing inference. Basic numerical methods, nonlinear statistical methods, numerical integration, modern simulation methods.

**5415. Advanced Statistical Methods**

Three credits. Prerequisite: Open only to Statistics graduate students; instructor consent.

Discrete and continuous random variables, exponential family, joint and conditional distributions, order statistics, statistical inference point estimation, confidence interval estimation, and hypothesis testing.

**5505. Applied Statistics I**

(Also offered as BIST 5505.) Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Exploratory data analysis: stem-and leaf plots, Box-plots, symmetry plots, quantile plots, transformations, discrete and continuous distributions, goodness of fit tests, parametric and non-parametric inference for one sample and two sample problems, robust estimation, Monte Carlo inference, bootstrapping.

**5515. Design of Experiments**

(Also offered as BIST 5515.) Three credits. Prerequisite: STAT 5005 or enrollment in Statistics M.A. or Ph.D. program. Not open for credit to students who have passed STAT 3515Q.

One way analysis of variance, multiple comparison of means, randomized block designs, Latin and Graeco-Latin square designs, factorial designs, two-level factorial and fractional factorial designs, nested and hierarchical designs, split-plot designs.

**5525. Sampling Theory**

(Also offered as BIST 5525.) Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Sampling and nonsampling error, bias, sampling design, simple random sampling, sampling with unequal probabilities, stratified sampling, optimum allocation, proportional allocation, ratio estimators, regression estimators, super population approaches, inference in finite populations.

**5535. Nonparametric Methods**

(Also offered as BIST 5535.) Three credits. Not open to students who have passed STAT 4875.

Theory and applications of statistical methods for analyzing ordinal, non-normal data: one and multiple sample hypothesis testing, empirical distribution functions and applications, order statistics, rank tests, efficiency, linear and nonlinear regression, classification.

**5585. Mathematical Statistics I**

(Also offered as BIST 5585.) Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Introduction to probability theory, transformations and expectations, moment generating function, discrete and continuous distributions, joint and marginal distributions of random vectors, conditional distributions and independence, sums of random variables, order statistics, convergence of a sequence of random variables, the central limit theorem.

**5605. Applied Statistics II**

(Also offered as BIST 5606.) Three credits. Prerequisite: STAT 5505.

Analysis of variance, regression and correlation, analysis of covariance, general linear models, robust regression procedures, and regression diagnostics.

**5615. Categorical Data Analysis**

(Also offered as BIST 5615.) Three credits. Prerequisite: STAT 5505 and 5605; or instructor consent.

Statistical analysis of data on a nominal scale: discrete distributions, contingency tables, odds ratios, interval estimates, goodness of fit tests, logistic/probit/complementary log-log regression, Poisson-related regression.

**5625. Introduction to Biostatistics**

(Also offered as BIST 5625.) Three credits. Prerequisite: Open only to Statistics graduate students; instructor consent.

Rates and proportions, sensitivity, specificity, two-way tables, odds ratios, relative risk, ordered and non-ordered classifications, trends, case-control studies, elements of regression including logistic and Poisson, additivity and interaction, combination of studies and meta-analysis.

**5635. Clinical Trials**

(Also offered as BIST 5635.) Three credits. Prerequisite: Open only to Statistics graduate students; instructor consent.

Basic concepts of clinical trial analysis; controls, randomization, blinding, surrogate endpoints, sample size calculations, sequential monitoring, side-effect evaluation and intention-to-treat analyses. Also, experimental designs including dose response study, multicenter trials, clinical trials for drug development, stratification, and cross-over trials.

**5645. Concepts and Analysis of Survival Data**

(Also offered as BIST 5645.) Three credits. Prerequisite: Open only to Statistics graduate students; instructor consent.

Survival models, censoring and truncation, nonparametric estimation of survival functions, comparison of treatment groups, mathematical and graphical methods for assessing goodness of fit, parametric and nonparametric regression models.

**5655. Epidemiology**

(Also offered as BIST 5655.) Three credits. Prerequisite: Open to graduate students in the Department of Statistics; others with consent.

The statistical study of health and illness in human and veterinary populations: epidemiological study designs, measures of disease frequency/effect/potential impact, selection and information biases, confounding, stratified analysis.

**5665. Applied Multivariate Analysis**

(Also offered as BIST 5665.) Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Multivariate normal distributions, inference about a mean vector, comparison of several multivariate means, principal components, factor analysis, canonical correlation analysis, discrimination and classification, cluster analysis.

**5675. Bayesian Data Analysis**

(Also offered as BIST 5675.) Three credits. Prerequisite: STAT 5585 and 5685; or instructor consent.

Theory of statistical inference based on Bayes' Theorem: basic probability theory, linear/nonlinear, graphical, and hierarchical models, decision theory, Bayes estimation and hypothesis testing, prior elicitation, Gibbs sampling, the Metropolis-Hastings algorithm, Monte Carlo integration.

**5685. Mathematical Statistics II**

(Also offered as BIST 5685.) Three credits. Prerequisite: STAT 5585.

The sufficiency principle, the likelihood principle, the invariance principle, point estimation, methods of evaluating point estimators, hypotheses testing, methods of evaluating tests, interval estimation, methods of evaluating interval estimators.

**5705. Statistical Methods in Bioinformatics**

(Also offered as BIST 5705.) Three credits. Prerequisite: STAT 5505 and 5585; or instructor consent.

Statistical methods and software tools for the analysis of biological data: sequencing methods; gene alignment methods; expression analysis; evolutionary models; analysis of proteomics, metabolomics, and methylation data; pathway analysis: gene network analysis.

**5725. Linear Statistical Models**

(Also offered as BIST 5725.) Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Linear and matrix algebra concepts, generalized inverses of matrices, multivariate normal distribution, distributions of quadratic forms in normal random vectors, least squares estimation for full rank and less than full rank linear models, estimation under linear restrictions, testing linear hypotheses.

**5815. Longitudinal Data Analysis**

(Also offered as BIST 5815.) Three credits. Prerequisite: STAT 5505 and 5605; or instructor consent.

Statistical theory and methodology for data collected over time in a clustered manner: design of experiments, exploratory data analysis, linear models for continuous data, general linear models for discrete data, marginal and mixed models, treatment of missing data.

**5825. Applied Time Series**

(Also offered as BIST 5825.) Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Introduction to prediction using time-series regression methods with non-seasonal and seasonal data. Smoothing methods for forecasting. Modeling and forecasting using univariate autoregressive moving average models.

**6315. Statistical Inference I**

Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Exponential families, sufficient statistics, loss function, decision rules, convexity, prior information, unbiasedness, Bayesian analysis, minimaxity, admissibility, simultaneous and shrinkage estimation, invariance, equivariant estimation.

**6325. Advanced Probability**

Three credits. Prerequisite: Open only to Statistics graduate students, others with consent.

Fundamentals of measure and integration theory: fields,  $\sigma$ -fields, and measures; extension of measures; Lebesgue-Stieltjes measures and distribution functions; measurable functions and integration theorems; the Radon-Nikodym Theorem, product measures, and Fubini's Theorem. Introduction to measure-theoretic probability: probability spaces and random variables; expectation and moments; independence, conditioning, the Borel-Cantelli Lemmas, and other topics as time allows.

**6494. Seminar in Applied Statistics**

(Also offered as BIST 6494.) Variable (1-6) credits. Prerequisite: Open only to Statistics graduate students, others with consent. May be repeated for credit.

**6515. Statistical Inference II**

Three credits. Prerequisite: STAT 6315; open only to Statistics graduate students, others with consent.

Statistics and subfields, conditional expectations and probability distributions, uniformly most powerful tests, uniformly most powerful unbiased tests, confidence sets, conditional inference, robustness, change point problems, order restricted inference, asymptotics of likelihood ratio tests.

**6694. Seminar in Multivariate Statistics**

Variable (1-6) credits. Prerequisite: Open only to Statistics graduate students, others with consent. May be repeated for a maximum of 12 credits.

**6894. Seminar in the Theory of Probability and Stochastic Processes**

Variable (1-6) credits. Prerequisite: Open only to Statistics graduate students, others with consent. May be repeated for a maximum of 12 credits.

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## Systems Engineering (SE)

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**5000. Introduction to Systems Engineering**

Three credits.

Introduction to the hard and soft skills that are required of good systems engineers. Lectures follow the competency models for systems engineers and include topics such as systems thinking, needs identification, requirements formulation, architecture definition, technical management, design integration, as well as verification and validation of designs. Some of the key systems engineering (SE) standards will be covered and the roles of organizations in enabling engineers to develop systems will be explored. Applications of SE concepts and tools in various settings will be discussed through examples and case studies. Students will learn to apply the SE methodologies in modern complex system development environments such as aerospace and defense, transportation, energy, communications, and modern software-intensive systems.

**5001. Model-Based Systems Engineering**

Three credits. Prerequisite: Undergraduate degree in engineering or science.

Provides students with the foundations of model-based systems engineering. Students will develop skills in the areas of fundamental logical, behavioral, and physical representations of engineered cyberphysical systems. Topics include

software and systems requirements engineering, interface design and modeling, system architecting, system verification and testing, and system simulation. Emphasis is placed on modeling cyberphysical systems using modern MBSE principles, methods, and tools. Examples include a water distiller, a residential security system, an automobile, an elevator, and a geospatial library for the demonstration of the theoretical and practical aspects of systems modeling. Designed for all graduate students pursuing graduate certificates and degrees in an engineering discipline.

**5095. Special Topics**

Variable (1-3) credits. May be repeated for credit.

General topics in systems engineering.

**5101. Foundations of Physical Systems Modeling**

Three credits. Recommended preparation: Undergraduate degree in Mechanical Engineering, Chemical Engineering, and Modelica Software.

Provides students with the foundations of physical systems modeling and computational methods for performance analysis. Students will develop skills in the areas of fundamental physical and mathematical representations of fluid dynamics, thermodynamics, heat transfer, and electro-mechanics. Introduction to concepts on how systems can be architected and designed with the aid of models. Topics include system and component requirements specification, creation of system models for design and control analysis of physical systems. Emphasis is placed on the modeling of such systems in the equation oriented programming environment of the Modelica language, and the utilization of these system models within the Functional Mockup Interface for co-simulation and Model Exchange. Examples of Aircraft Environmental Control, Chiller Systems and Plants, Engine Fuel Systems, Variable Frequency Drives and Electric Machines are used for the demonstration of the theoretical and modeling aspects of physical system modeling.

**5102. Uncertainty Analysis, Robust Design, and Optimization**

Three credits. Prerequisite: SE 5101.

Provides students with a thorough understanding of platform-based and model-driven methods for uncertainty analysis and robust design of cyber-physical systems. Topics include modeling of uncertainties, sensitivity analysis, robust design analysis methodologies (DFSS, IDOV), and critical parameter management (CPM).

**5201. Embedded/Networked Systems Modeling Abstractions**

Three credits. Recommended preparation: Background in hardware and/or software design.

Familiarizes students with design flows for designing, implementing and verifying embedded systems, and to provide skills necessary to specify requirements and perform platform-based design, analysis and modeling of embedded and networked systems. These models will be motivated by applications which demonstrate embedded systems design challenges of satisfying time-critical, event-driven, and data-centric requirements. Students will be cognizant of the role of embedded controllers and devices in the system design process, as they relate to event-driven and data-driven systems, and supervisory control of hybrid (continuous and discrete-time) systems. This will include

exposure to platform-based design principles with an emphasis on requirements capture and refinement to platform architecture mapping, analysis and verification. Students will learn the technical aspects of modeling principles relevant to embedded systems, specifically modeling system architecture, system functions, computation, software, real-time systems, and distributed systems.

#### **5202. Foundations of Control**

Three credits. Prerequisite: SE 5101. Recommended preparation: undergraduate course in systems analysis.

Familiarizes students with system design flows used for designing, implementing and verifying control systems and to provide skills necessary to design and analyze practical regulatory controllers for Cyber-Physical systems. Successful students will be cognizant of the role of controls in the system design process and will be proficient in specifying control system requirements, especially as they relate to attenuation of load disturbances, robustness to dynamic system model uncertainty, actuator nonlinearities, and measurement noise; knowledgeable of the distinctions between modeling systems for control and understanding the fundamental limits of regulatory control systems; knowledgeable of the role of control architectures for regulatory controllers, including sensor selection and sizing of actuators; aware of practical control design methods focusing on PID controllers; controller implementation, validation, testing, diagnostics and tuning. Use of computer-aided engineering tools (Dymola, MATLAB/Simulink) in the design flows for control of cyber-physical systems is emphasized.

#### **5302. Formal Methods**

Three credits. Prerequisite: SE5201.

Introduction to formal methods as a framework for the specification, design, and verification of software-intensive embedded systems. Topics include automata theory, model checking, theorem proving, and system specification. Examples are driven by cyber-physical systems.

#### **5402. Architecture of IoT**

Three credits. Prerequisite: SE 5001 or 5101 or 5102.

Provides students with a thorough understanding of the design, verification, and validation of embedded/network systems and software-intensive systems. The student will develop skills in specifying requirements for embedded software systems, model based architecture and design, and verification and validation of embedded systems. Special emphasis will be placed on distributed embedded systems and real-time systems. The platform-based design (PBD) flow will be used as the common thread through the course. Examples are driven by cyber-physical systems.

#### **5502. Capstone Projects for Systems Engineering**

Three credits. Prerequisite: SE 5001 or 5101 or 5102.

This project course is designed to provide students with a thorough understanding of cyber-physical systems modeling and design through a comprehensive capstone project. These projects will be practical and relevant to industry needs. Students submit a Project Proposal before

registering for the course, and develop the proposal with feedback from a faculty member. The graduate student is expected to spend the same amount of time for the project course as any other graduate three-credit course in systems engineering.

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### **Translation Studies (TRST)**

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#### **5310. Literary Translation: Theory and Practice**

Three credits. Prerequisite: Six credits of upper division coursework (3000-level or higher) in a foreign language (or the equivalent).

A study of the theoretical and practical aspects of literary translation. Translating literature from various genres.

#### **5311. Literary Translation Seminar**

Three credits. Prerequisite: Six credits of upper division coursework (3000-level or higher) in a foreign language (or the equivalent).

Translating literature and studying the practical aspects of the craft of literary translation.

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### **Women's, Gender, and Sexuality Studies (WGSS)**

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#### **5315. Gender and Culture**

(Also offered as ANTH 5315.) Three credits.

Anthropological perspectives on the analysis of gender with special focus on dynamics of gender, culture, and power.

#### **5333. Topics in the History of American Women**

(Also offered as HIST 5555.) Three credits. Prerequisite: Instructor consent. May be repeated for a total of nine credits.

#### **5341. Analysis of Rituals**

Three credits. Prerequisite: ANTH 5311.

Examines various theoretical contributions to the anthropological study of ritual. Controversies and ambiguities surrounding the social and symbolic significance of the ritual act for both men's and women's experiences and participation are addressed.

#### **5365. Feminist Methodologies**

Three credits.

Theoretical underpinnings of diverse feminist methodologies and interdisciplinary scholarship. Contemporary debates in the field and ethical dilemmas faced by researchers using feminist, interdisciplinary and intersectional epistemologies. Relationship to critical race, indigenous, and queer methodologies. Guided experience in designing and producing feminist scholarship.

#### **5366. Feminist Pedagogy**

Three credits.

Overview of feminist and critical epistemologies and pedagogical tools for use in interdisciplinary classrooms in varied academic contexts.

#### **5371. Genders, Sexualities, and Theories**

Three credits.

Genders and sexualities with special attention given to lesbian, gay, bisexual, and transgender issues.

#### **5390. Independent Study for Graduate Students**

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

#### **5395. Special Topics Seminar in Women's Studies**

Three credits. May be repeated for a total of nine credits.

Topics of current interest from a feminist perspective.

#### **5398. Variable Topics in Women's Studies**

Three credits. May be repeated for a total of nine credits.

With a change in topics, may be repeated for credit.

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The Graduate Faculty Council is the legislative body of the Graduate School. It establishes academic policy for graduate education, except for those areas reserved to the Board of Trustees, to the University Senate, or to the faculties of other colleges and schools. The 60 members, representing specific content areas derived from constituent Fields of Study, are elected to serve three year terms. The membership includes two voting student members chosen by the Graduate Student Senate. The President, the Provost, the Vice Provost for Graduate Education and Dean of the Graduate School, and certain other administrative officers of the Graduate School are non-voting, ex-officio members. The Council, representing the Graduate at large, exercises legislative authority in such areas as admissions criteria, curricular and degree requirements, new course approval, academic program review, and the like.

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The Executive Committee has both executive and advisory responsibilities to the Graduate Faculty Council and to the Vice Provost for Graduate Education and Dean of the Graduate School. Its membership is drawn from the Graduate Faculty Council and from the Graduate Faculty at large. The Dean serves as chair. The Executive Committee is the steering

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