



Photo by Sarah Macri '25 (CLAS)

University of Connecticut Graduate Catalog 2023-24

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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 Commission of Higher Education.

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. The University of Connecticut 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; Website: equity.uconn.edu.

Academic Calendar

Fall Semester 2023

Mon, Aug 28	Fall semester begins
Mon, Sep 4	Labor Day – No classes
Mon, Sep 11	Courses dropped after this date will have a “W” for withdrawal recorded on the academic record. Last day to add or drop courses without additional signatures.
Fri, Sep 22	Deadline to apply for graduation and to submit Final Plan of Study for conferral of a Fall 2023 degree
Tue, Sep 26	Dean of The Graduate School’s signature required to add courses
Fri, Oct 6	Mid-semester progress reports due students from faculty
Mon, Oct 23	Registration for the Winter 2024 and Spring 2024 semester via Student Administration System begins
Mon, Nov 13	Last day to withdraw from a course Last day to place courses on or remove from Pass/Fail grading
Sun, Nov 19-Sat, Nov 25	Thanksgiving Recess
Fri, Dec 1	Last day for Master’s and Doctoral degree candidates to upload final thesis and dissertation to Submittable and submit related paperwork to Degree Audit (degreeaudit@uconn.edu) for conferral of a Fall 2023 degree. It is recommended that students defend at least two weeks prior to this deadline to allow for revisions. Doctoral dissertation defense must be announced two weeks prior to defending. Plan A Master’s students are not required to announce their defense.
Fri, Dec 8	Last day of fall semester classes
Sat, Dec 9-Sun, Dec 10	Reading Days
Mon, Dec 11	Final examinations begin
Thu, Dec 14	Reading Day
Sun, Dec 17	Final examinations end Conferral date for Fall 2023 degrees Final examinations for Plan B Master’s and Sixth-Year Certificate students must be completed by this date.
Wed, Dec 20	Semester grades due at 4 pm
Fri, Dec 29	Last day for Degree Audit (degreeaudit@uconn.edu) to receive the approved Plan B Master’s Report on the Final Exam form.

Faculty are urged to try not to schedule exams on dates of religious observation, for more information visit provost.uconn.edu/religious-observations/.

**Start of Summer 2024 registration has yet to be determined. For Summer and Winter term calendars, visit summerwinter.uconn.edu.*

**Please consult the online calendar for possible deadline revisions at registrar.uconn.edu/academic-calendar.*

Spring Semester 2024

Tue, Jan 16	Spring semester begins
Mon, Jan 29	Courses dropped after this date will have a “W” for withdrawal recorded on the academic record. Last day to add or drop courses without additional signatures.
Fri, Feb 9	Deadline to apply for graduation and to submit Final Plan of Study for conferral of a Spring 2024 degree
Tue, Feb 13	Dean of The Graduate School’s signature required to add courses
Fri, Feb 23	Mid-semester progress reports due students from faculty
Fri, Mar 1	Deadline to apply for Summer 2024 graduation to be included in the 2024 Commencement Book
Sun, Mar 10-Sat, Mar 16	Spring Recess
Mon, Mar 18	Registration for the Summer 2024 and Fall 2024 semester via Student Administration System begins
Sat, Mar 23	Emergency closing class makeup date
Mon, Apr 8	Last day to withdraw from a course Last day to place courses on or remove from Pass/Fail grading
Fri, Apr 19	Last day for Master’s and Doctoral degree candidates to upload final thesis and dissertation Submittable and submit related paperwork to Degree Audit (degreeaudit@uconn.edu) for conferral of a Spring 2024 degree. It is recommended that students defend at least two weeks prior to this deadline to allow for revisions. Doctoral dissertation defense must be announced two weeks prior to defending. Plan A Master’s students are not required to announce their defense.
Fri, Apr 26	Last day of spring semester classes
Sat, Apr 27-Sun, Apr 28	Reading Days
Mon, Apr 29-Sat, May 4	Final examinations
Sat, May 4-Mon, May 6	Commencement ceremonies. For more information, please visit commencement.uconn.edu
Sun, May 5	Conferral date for Spring 2024 degrees Final examinations for Plan B Master’s and Sixth-Year Certificate students must be completed by this date.
Tues, May 7	Semester grades due at 4 pm
Fri, May 17	Last day for Degree Audit (degreeaudit@uconn.edu) to receive the approved Plan B Master’s Report on the Final Exam.

Summer Term 2024

Fri, June 7	Deadline to apply for graduation and to submit final Plan of Study (Undergraduate, Master’s, Sixth-Year, and Graduate Certificate students only) for conferral of a Summer 2024 degree.
Fri, Aug 9	Last day for Master’s and Doctoral degree candidates to upload final thesis and dissertation Submittable and submit related paperwork to Degree Audit (degreeaudit@uconn.edu) for conferral of a Summer 2024 degree. It is recommended that students defend at least two weeks prior to this deadline to allow for revisions. Doctoral dissertation defense must be announced two weeks prior to defending. Plan A Master’s students are not required to announce their defense.
Sat, Aug 24	Conferral date for Summer 2024 degrees. Final examinations for Plan B Master’s and Sixth-Year Certificate students must be completed by this date.
Fri, Sept 6	Last day for Degree Audit (degreeaudit@uconn.edu) to receive the approved Plan B Master’s Report on the Final Exam.

Fields of Study and Concentrations

The Graduate School oversees all graduate programs, including all graduate degrees and certificates (post-master's/sixth year, graduate, and post-baccalaureate), 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 Education
- Doctor of Musical Arts
- Doctor of Nursing Practice
- Doctor of Philosophy
- Doctor of Physical Therapy
- 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

Fields of Study

College of Agriculture, Health and Natural Resources

- Agricultural and Resource Economics Ph.D.
- Animal Science..... M.S., Ph.D.
 - Animal Genetics and Genomics
 - Animal Physiology
 - Food Microbiology and Safety
 - Meat Science
 - Stem Cell and Regenerative Biology
- 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
- 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.
 - Bacteriology

- Pathology
- Veterinary Anatomic Pathology
- Virology
- Pathobiology..... Ph.D.
 - Bacteriology
 - Pathology
 - Virology
- Personalized Nutrition M.S.
- Physical Therapy D.P.T.
- Plant Science..... M.S.
 - Agronomy
 - Horticulture
 - Landscape Architecture
 - Plant Breeding
 - Plant Environment
 - Soil Chemistry
 - Soil Science
- Plant Science..... Ph.D.
 - Agronomy
 - Horticulture
 - Plant Breeding
 - Plant Environment
 - Soil Chemistry
 - Soil Science
- Polymer Science M.S., Ph.D.
- Systems Genomics Ph.D.

School of Business

- Accounting..... M.S.
- Business Administration..... M.B.A.
 - Business Analytics
 - Business Ethics and Compliance
 - Digital Marketing Strategy
 - Finance
 - General Business
 - Management
- Business Administration..... Ph.D.
 - Accounting
 - Finance
 - Management
 - Marketing
 - Operations and Information Management
- Business Analytics and Project Management..... M.S.
 - Actuarial Science
 - Business Data Science
 - Health Care Analytics
 - Marketing Analytics
 - Supply Chain Analytics
 - Talent Analytics
- Business Research M.S.
- Financial Risk Management..... M.S.
 - Quantitative Risk Management
- Financial Technology..... M.S.
- 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.
 Environmental Engineering
 Geotechnical Engineering
 Structural Engineering
 Transportation and Urban Engineering

Civil Engineering..... Ph.D.
 Applied Mechanics
 Geotechnical Engineering
 Structural Engineering
 Transportation and Urban Engineering

Computer Science and Engineering..... M.S., Ph.D.

Electrical Engineering..... M.S., Ph.D.
 Electronics, Photonics, and Biophotonics
 Information, Communication, Decision, and Energy Systems

Engineering..... M.Eng.
 Advanced Manufacturing for Energy Systems
 Advanced Systems Engineering
 Biomedical Engineering
 Chemical Engineering
 Civil Engineering
 Computer Science and Engineering
 Data Sciences
 Electrical and Computer Engineering
 Environmental Engineering
 General Engineering
 Global Entrepreneurship
 Manufacturing 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
 Thermal and Fluid Sciences

Polymer Science M.S., Ph.D.

Regenerative EngineeringM.S.

School of Fine Arts

Art.....M.F.A.

Arts Leadership and Cultural Management..... M.F.A.

Digital Media Design M.A., M.F.A.

Dramatic Arts.....M.A.
 Acting
 Puppet Arts
 Production and Design

Dramatic Arts.....M.F.A.
 Acting

Design
 Directing
 Puppet Arts
 Technical Direction

Music D.M.A.
 Conducting
 Performance

Music M.A.
 Historical Musicology
 Music Theory

Music M.Mus.
 Conducting
 Performance

Music Ph.D.
 Music Theory and History

The Graduate School

Data ScienceM.S.
 Advanced Data Analysis
 Bioinformatics
 Biostatistics
 Business Data Science
 Cloud Computing
 Cybersecurity
 Dependent Data Analysis
 Geospatial Analysis
 Healthcare Analytics
 Marketing Analytics
 Social and Behavioral Analytics
 Talent Analytics

Integrative Studies Ph.D.

College of Liberal Arts and Sciences

Anthropology.....M.A., Ph.D.

Applied Biochemistry and Cell Biology.....M.S.

Applied Financial MathematicsM.S.
 Actuarial Science

Applied Genomics.....M.S.

Applied Microbial Systems Analysis.....M.S.

Biodiversity and Conservation Biology.....M.S.

Biostatistics.....M.S.

Chemistry..... M.S., Ph.D.

CommunicationM.A., Ph.D.

Ecology and Evolutionary Biology..... M.S., Ph.D.

EconomicsM.A., Ph.D.

Energy and Environmental ManagementM.S.

EnglishM.A., Ph.D.

Environmental Earth SciencesM.S.

Genetic CounselingM.S.

GeographyM.A., Ph.D.

Geological Sciences M.S., Ph.D.
 Geology
 Geophysics

HistoryM.A., Ph.D.

Human Development and Family Sciences.....	M.A., Ph.D.
Human Rights.....	M.A.
Intersectional Indigeneity, Race, Ethnicity, and Politics	M.A.
Latina/o and Latin American Studies.....	M.A.
Linguistics	M.A., Ph.D.
Literatures, Cultures and Languages.....	M.A., Ph.D.
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	
Spanish Studies	
Materials Science.....	M.S., Ph.D.
Mathematics	M.S.
Actuarial Science	
Mathematics	Ph.D.
Medieval Studies	M.A., Ph.D.
Molecular and Cell Biology.....	M.S., Ph.D.
Cell and Developmental Biology	
Genetics and Genomics	
Microbiology	
Structural Biology, Biochemistry and Biophysics	
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.
Politics and Popular Culture.....	M.A.
Polymer Science.....	M.S., Ph.D.
Psychological Sciences	M.S., Ph.D.
Behavioral Neuroscience	
Clinical Psychology	
Developmental Psychology	
Ecological Psychology	
Industrial and Organizational Psychology	
Language and Cognition	
Neurosciences	
Social Psychology	
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., Au.D., Ph.D.
Statistics	M.S., Ph.D.
Surgical Neurophysiology.....	M.S.
Survey Research and Data Analysis	M.A.
Systems Genomics	Ph.D.

School of Medicine

Biomedical Science.....	M.S., Ph.D.
Cell Biology	
Genetics and Developmental Biology	

Immunology
Molecular Biology and Biochemistry
Neuroscience
Skeletal Biology and Regeneration
Systems Biology

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.

Neag School of Education

Curriculum and Instruction	M.A.
Bilingual and Multicultural Education	
Elementary Education	
Literacy Specialist Program	
Music Education	
Reading and Language Arts Consultant	
Remedial Reading and Remedial Language Arts Teacher	
Secondary Education: Agricultural Education	
Secondary Education: English Education	
Secondary Education: History and Social Studies	
Secondary Education: Mathematics Education	
Secondary Education: Science Education	
Secondary Education: World Language Education	
Curriculum and Instruction	Ph.D.
Bilingual and Multicultural Education	
Elementary Education	
Reading Education	
Secondary Education: English Education	
Secondary Education: History and Social Studies	
Secondary Education: Mathematics Education	
Secondary Education: Science Education	
Secondary Education: World Language Education	
Educational Leadership.....	Ed.D.
Educational Psychology	M.A.
Counselor Education and Counseling Psychology	
Educational Technology	
Giftedness, Creativity, and Talent Development	
Learning Sciences	
Research Methods, Measurement, and Evaluation	
School Psychology	
Special Education	
Educational Psychology	Ph.D.
Counselor Education and Counseling Psychology	
Giftedness, Creativity and Talent Development	
Learning Sciences	
Research Methods, Measurement, and Evaluation	
School Psychology	
Special Education	
Higher Education and Student Affairs	M.A.
Learning, Leadership, and Education Policy.....	Ph.D.
Adult Learning	
Higher Education Racial Justice and Decolonization	

Leadership and Policy
 Sport Management
 Sport ManagementM.S.

School of Nursing

NursingD.N.P.
 Adult Gerontology Acute Care Nurse Practitioner
 Adult Gerontology Primary Care Nurse Practitioner
 Family Nurse Practitioner
 Neonatal Nurse Practitioner
 Nurse Leader

NursingM.S.
 Adult Gerontology Acute Care Nurse Practitioner
 Adult Gerontology Primary Care Nurse Practitioner
 Family Nurse Practitioner
 Neonatal Nurse Practitioner
 Nurse Educator
 Nurse Leader

Nursing Ph.D.

School of Pharmacy

Materials Science..... M.S., Ph.D.
 Pharmaceutical Sciences M.S., Ph.D.
 Medicinal and Natural Products Chemistry
 Pharmaceutics
 Pharmacology and Toxicology

Polymer Science M.S., Ph.D.

School of Social Work

Social Work M.S.W.
 Community Organizing
 Individuals, Groups, and Families
 Policy Practice

Social Work Ph.D.

**Post-Master’s/Sixth Year
 Certificates**

Neag School of Education

Adult Learning
 Curriculum and Instruction
 Bilingual and Multicultural Education
 Elementary Education
 Literacy Specialist Program
 Reading and Language Arts Consultant
 Remedial Reading and Language Arts Teacher
 Secondary Education: English Education
 Secondary Education: History and Social Studies Education
 Secondary Education: Mathematics Education
 Secondary Education: Science Education
 Secondary Education: World Language Education
 Educational Administration
 Educational Psychology
 Counseling
 Educational Technology

Giftedness, Creativity and Talent Development
 Learning Sciences
 School Psychology
 Special Education

School of Nursing

Nurse Educator
 Nurse Leader
 Post-Graduate APRN Certificate Program
 Adult Gerontology Acute Care Nurse Practitioner
 Adult Gerontology Primary Care Nurse Practitioner
 Family Nurse Practitioner
 Neonatal Nurse Practitioner

Graduate Certificates

College of Agriculture, Health and Natural Resources

Exercise Prescription
 Global Health
 Health Promotion and Health Education
 Obesity Prevention and Weight Management
 Precision Nutrition
 Remote Sensing and Geospatial Data Analytics
 Sustainable Environmental Planning and Management
 Systems Genomics: Clinical Communication and Counseling

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 Financial Technology
 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 Project Management
 Advanced Business Certificate in Supply Chain Analytics
 Corporate and Regulatory Compliance
 Global Risk Management
 Long-Term Health Care Management

School of Engineering

Advanced Materials Characterization
 Advanced Systems Engineering
 Bridge Engineering
 Composites
 Contaminated Site Remediation
 Engineering Data Sciences
 Oceanographic Science and Technology
 Power Engineering
 Power Grid Modernization
 Process Engineering

School of Fine Arts

Arts Leadership and Cultural Management
 Digital Media and Design
 Music Performance
 Puppet Arts

The Graduate School

Genomic Data Analysis

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
 Global Health
 Health Psychology
 Human Rights
 Intersectional Indigeneity, Race, Ethnicity, and Politics
 Intraoperative Neuromonitoring
 Leadership and Public Management
 Literary Translation
 Logic
 Neurobiology of Language
 Nonprofit Management
 Obesity Prevention and Weight Management
 Occupational Health Psychology
 Oceanographic Science and Technology
 Public Financial Management
 Quantitative Research Methods in Psychology
 Survey Research
 Systems Genomics: Clinical Communication and Counseling

School of Medicine

Addiction Science
 Biomedical Science Research Experience
 Clinical Genetics and Genomics
 Clinical and Translational Research
 Disability Studies in Public Health
 Foundations of Public Health
 Global Health
 Obesity Prevention and Weight Management
 Social Determinants of Health and Disparities

Neag School of Education

Applied Behavior Analysis
 College Instruction
 Educating Bilingual Learners
 Emerging Women's Leadership
 Executive Leadership Program
 Gifted Education and Talent Development

Licensed Professional Counselor
 Leadership and Diversity in Sport Management
 Literacy and Deaf Education
 Literacy Leadership
 Literacy Supports
 Postsecondary Disability Services
 Program Evaluation
 School Law
 School-wide Positive Behavior Support
 Special Education Transition to Adulthood
 Systems Genomics: Clinical Communication and Counseling

School of Nursing

Dementia Care
 Health Care Innovation
 Health Professions Education
 Holistic Nursing
 Life Story Practice and Research
 Pain Management

School of Social Work

Global Health

Post-Baccalaureate Certificates**College of Agriculture, Health, and Natural Resources**

Diagnostic Genetic Sciences
 Medical Laboratory Sciences
 Occupational Safety and Health

Enrichment Programs

Pre-Medical and Health Professions

Dual Degree Programs

D.M.D./Ph.D. (Biomedical Science)
 J.D./M.B.A.
 J.D./M.P.A.
 J.D./M.P.P.
 M.B.A./M.A. (Latina/o and Latin American Studies)
 M.B.A./M.Eng.
 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./Ph.D. (Biomedical Science)
 M.B.A./Pharm.D.
 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./Pharm.D.

M.S.W./J.D.

Admission

To earn a graduate degree or certificate in any program, a student must apply and be admitted. This requirement applies to both external applicants and currently matriculated students who wish to pursue a certificate or additional graduate degree. Students may earn a graduate degree or certificate only in a program to which they have been admitted. By accepting admission, the student assumes responsibility for knowing and complying with the regulations and procedures set forth by the University.

The Graduate School processes applications for all graduate programs, including all graduate degrees and certificates (graduate, post-baccalaureate, and post-master's/sixth year), with the exception of the Doctor of Pharmacy and programs with degrees conferred by the School of Dental Medicine, School of Law, and School of Medicine. A non-refundable application fee must accompany every submitted application, except when explicitly waived by The Graduate School (see details below).

In most cases, 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 the student's major advisors in both programs. There are several approved dual degree programs providing the opportunity for a 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. However, separate applications must be submitted to The Graduate School for each of the degree programs involved in a dual degree program.

When a degree program offers areas of concentration, a student can complete the degree with more than one area of concentration, provided the student has the approval of their major advisor. With the approval of their advisory committee, a student may use the same course to meet the requirements of more than one area of concentration within their degree program. For programs that require a dissertation or thesis, a single dissertation or thesis should be written to satisfy the degree requirements even when the student otherwise completes the requirements for multiple areas of concentration within that field of study.

Students can request a deferral of admission from a program to which they were admitted for up to one year after their initial application term. These requests will be reviewed by The Graduate School.

Graduate Degree Programs

Regular Status

To be admitted to regular status and to begin studies in any graduate degree program, an applicant must hold a baccalaureate from a regionally accredited college or university or present evidence of the equivalent. The applicant must upload unofficial transcripts covering all previous undergraduate and graduate work. All transcripts submitted, including test scores, become the property of The Graduate School and are not returnable. Failure to disclose transcripts from all educational institutions, regardless of whether or not a degree was received, may be grounds for cancellation of admission.

Except in exceptional circumstances, to be considered for admission to a graduate degree program, a student's prior coursework must meet one of the following criteria:

1. A cumulative GPA for their most recent degree of 3.0 or higher for the entire degree, or
2. If the most recent degree is an undergraduate degree or the student has not yet completed their undergraduate degree:
 - a. A GPA of 3.0 or higher for the entire two most recent years of full-time undergraduate coursework, or
 - b. A GPA of 3.5 or higher for the entire most recent year of full-time undergraduate coursework, or
3. If a student has taken at least one semester of full-time study following the completion of the most recent undergraduate or graduate degree, a GPA of 3.0 or higher for all of their post-degree coursework.

The grade point average is computed using 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 submit official transcripts showing all work completed.

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 many programs are encouraged to submit test scores from the General Test of the Graduate Record Examinations (GRE) directly to The Graduate School. When required, GRE scores must be submitted electronically. Letters of recommendation, usually three and 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 spaces, the successful applicant must have a record competitive with those of other applicants in the same field.

Regardless of visa status, students whose primary* language is not English, must also show evidence of proficiency in the English language for admission into a graduate program. English proficiency requirements can be found on The Graduate School's website: grad.uconn.edu/admissions/requirements/#englishtest.

Once matriculated, students who were admitted and demonstrated English language proficiency through one of the methods listed on The Graduate School's website: grad.uconn.edu/admissions/requirements/#englishtest do not need to provide additional evidence of English language proficiency or retake English language proficiency tests if they are applying to another program through The Graduate School at UConn.

International students whose primary language* is not English and expect to hold teaching assistantships must also satisfy the University's English Proficiency Policy (available at ita.uconn.edu) before being allowed direct instructional contact.

*Primary language is defined as a language used to communicate since childhood.

Provisional Status

Occasionally, students who hold a baccalaureate degree 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. (Applicants cannot be admitted provisionally to a doctoral program.) However, regular (not provisional) status is required for degree conferral. 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 or A-. Additionally, students with provisional admission are not eligible to be appointed as a graduate assistant, until they have achieved regular status.

Language-Conditional Status

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 by the program to which they apply. Applicants will have 12 months to meet the proof of English proficiency requirement by receiving a Certificate of English Proficiency from the University of Connecticut American English Language Institute (UCAELI) and/or receiving a passing English proficiency score through one of the methods listed on The Graduate School's website: grad.uconn.edu/admissions/requirements/#englishtest. Additionally, students with language-conditional admission are not eligible to be appointed as a graduate assistant, until they have achieved regular status.

Certificate Programs

The University of Connecticut offers three types of certificate programs: graduate certificates, post-master's (or sixth year) certificates, and post-baccalaureate certificates. Post-master's/sixth year certificates that require 30 or more credits for completion follow the admission rules and requirements for master's degrees given above. Other certificates, which typically require fewer than 30 credits, follow the admissions rules and requirements stated below. 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. A certificate itself is not a 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 require applicants to hold an advanced degree prior to admission. In addition, applicants to certificate programs must meet The Graduate School requirements for admission to degree programs, including minimum GPA requirements, outlined above.

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 GPA of 2.6 or higher, or have completed three credits of the certificate coursework with a 3.0 GPA or higher. If a provisionally matriculated 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. Should a non-degree student later be admitted to a graduate degree or certificate program at the University, limited credits will be acceptable toward the degree or certificate. (See details in the section on "Academic Regulations".) For further information regarding registration for non-degree coursework, contact the Office of the Registrar at registrar@uconn.edu or 860-486-3331.

Admission of University Faculty

University of Connecticut faculty members who hold tenure or a faculty 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 School.

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. 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 application processing fee must accompany every submitted application, except when explicitly waived by The Graduate School. It may not be applied toward other charges. The application fee is waived for students currently enrolled in a UConn graduate program (certificate, master's, or Ph.D.) when they apply to another graduate program. Similarly, if a student completes a UConn graduate program and is applying for admission to another program in the semester that immediately follows, the application fee will be waived. (The waiver does not apply if there is a break in enrollment). The fee is also waived for current University Scholars applying to a master's program. Information regarding application fee waivers can be found on The Graduate School's website: grad.uconn.edu/admissions/application-fee-waivers/.

In-State and Out-of-State Status

For tuition based programs each student must file an affidavit of residence with the application for admission to The Graduate School, which determines residency status. A form for this purpose is provided as part of the electronic application. On the basis of this information, each entering student is classified as being either a Connecticut student (eligible for in-state tuition) or an out-of-state student. Some programs at the University of Connecticut are considered fee-based programs, and all students pay the same fees, regardless of residency.

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.

Deadlines

Application deadlines vary across programs. Applicants should check with appropriate academic departments concerning deadlines and are advised to submit their applications for admission as early as possible. At a minimum, applicants should submit the application for admission several months in advance of the term to which they are applying. In all cases, 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 in a graduate program, a student must be matriculated by the Dean of The Graduate School before the first day of classes in the student's admitted term. Matriculation requires that all credentials, including official transcripts and diplomas or degree certificates (for international students), covering all undergraduate and graduate work taken up to the time of application, be received at The Graduate School by deadline dates. In some cases, all official transcripts showing final grades and degree conferrals may not be available at the time of matriculation. In this case, for all coursework other than coursework taken at the University of Connecticut, students must submit these transcripts prior to registering for their second term in their graduate program. The submitted transcripts must include final grades for any coursework taken as part of a baccalaureate or graduate degree, as well as any additional non-degree coursework that was in progress at the time of the student's application. A student cannot register beyond the first term unless all official transcripts showing final grades and degree conferrals have been received by The Graduate School. Official transcripts from the University of Connecticut are not required to be submitted.

In addition, except under unusual circumstances or when conducting off-campus research or holding an off-campus internship or fellowship, students enrolled in on-campus programs must arrive on campus on or before the first day of classes for the academic term in which they plan to enroll. Failure to meet these conditions may cause 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 term to which they have been admitted. If this occurs, the student must reapply for admission with no certainty of being accepted. As noted above, 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.

Tuition and Fees

The schedule of tuition and fees contained on the Office of the Bursar website is comprehensive and expected to prevail during any given academic year. However, the Board of Trustees and the Board of Governors for Higher Education reserve the right, at any time, to authorize changes applicable to all currently enrolled students. Revisions in the State’s budget may force changes. Graduate students should refer to the Office of the Bursar website at: bursar.uconn.edu for current tuition and fee information, procedures, and policies pertaining to graduate students and graduate programs. Note that fees and credit costs can vary across different programs.

Bill Payments

Tuition and Fee Payments. Collection of all charges, including tuition and fees, is handled by the Office of the Bursar. All payments should be made payable to the University of Connecticut and sent to the Office of the Bursar no later than the Friday before the start of the semester.

Payment in full is required and no exceptions to this policy are granted for partial payment, unless enrolled in one of the University’s offered payment plans. Failure to make payment on time will result in cancellation of the privileges accorded to a student such as, but not limited to, use of recreational facilities, access to transcripts, and the ability to register for future semesters. Students who register for additional courses after the payment due date have ten days to make payment before they are considered late.

It is each student’s financial responsibility to make payments by the specified due dates. Failure to receive a bill does not relieve a student of payment responsibility. Students are required to agree to the Student Financial Responsibility Agreement once every academic year. This agreement is a statement of the financial obligations and responsibilities each student assumes while attending UConn. Please refer to the Office of the Bursar website for more information on the agreement and on failure to pay.

Late Payment Fee. A late payment fee is payable by all students whose tuition and fees are not paid in full on the published due date. Late payment fees may be assessed twice a semester. Checks returned by the bank for any reason are considered late payments and the student is charged a returned check fee. Students may have services denied if all required payments have not been made by the due date. Please refer to the Bursar’s website for more information.

Tuition and Fee Adjustments and Cancellations of Charges

The following is general information regarding cancellations and adjustments of tuition and fees. If a student is a recipient of federal financial aid, it is critical that they also read the information under the “Return of Federal Financial Aid” section of the Office of Student Financial Aid Services website.

In order to be eligible for an adjustment of tuition and fees 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.

All graduate students who withdraw from the University for any reason must secure from The Graduate School acknowledgement of their withdrawal and arrange the details of their leaving by completing a Voluntary Separation Notification form (see grad.uconn.edu/graduate-students/voluntary-separation/). No adjustments are made unless this procedure is followed. When notice of cancellation is received prior to the first day of classes of a semester, a full refund (less ineligible fees) is made if all charges have been paid in full.

If a student is dismissed after a semester but before the start of the next semester, payments (if any) for the next semester will be refunded with the exception of certain non-refundable deposits.

The University grants a full refund, if paid, to any student dismissed for academic deficiency or other cause, provided that the dismissal is effective prior to the start of classes.

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

Adjustments 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 tuition and fee adjustment 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, a full refund (less ineligible fees) will be made if the charges have been paid in full. Thereafter, adjustments or cancellations of eligible charges will be made according to the following schedule:

1 st day of classes	100%
Remainder of the 1 st calendar week.....	90%
2 nd week	60%
3 rd and 4 th week.....	50%
5 th week through 8 th week.....	25%

Reinstatement Fee

The Graduate School regulations require registration in each semester by all graduate degree and certificate students, with the exception of those students on an approved academic 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. A student who has been dropped from active status may request reinstatement within one year. If the student is approved for reinstatement, a reinstatement fee is added to a student’s bill along with any registration fee that has accrued.

Assistantships, Fellowships, and Other Aid

Types of Financial Support

Financial support for graduate students engaged in study at the University of Connecticut comes from many sources. Two general types of financial aid are available:

1. Merit-based support, which include graduate assistantships (for teaching or research) and fellowships. Application for graduate assistantships should be made directly to the academic department offering the assistantship. Students interested in fellowships offered through The Graduate School should monitor the website for appropriate application procedures and deadlines.
2. Financial aid offered by the Office of Student Financial Aid Services (OSFAS), includes Federal Direct Student Loans, Federal Direct PLUS Loans, and Federal Work-Study. Citizens or permanent residents of the United States can apply for financial aid by completing the Free Application for Federal Student Aid (FAFSA) at www.fafsa.gov. The University of Connecticut's on-time application deadline is February 15.

International students are not eligible to receive financial aid offered through the Office of Student Financial Aid Services. Undocumented students may qualify for certain types of financial aid. Please visit the Office of Student Financial Aid Services website (financialaid.uconn.edu) for more information.

Many additional sources of funding for graduate education exist through both external and internal opportunities. Graduate students are encouraged to seek opportunities for external sources of support, such as prestigious national fellowships. Opportunities to seek external funding can be found through the Office of National Scholarships and Fellowships at 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.

Categories of Merit-based Support

Many graduate students engaged in full-time degree study at the University of Connecticut receive merit based support in the form of graduate assistantships for teaching or research, whereas others hold fellowships, traineeships, or internships. More specifically:

1. A graduate assistantship (in the form of a 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 University. All assistantships must be administered through an academic department. Appointments are ordinarily made for the nine-month period from August 23 through May 22.
2. A fellowship is awarded to a graduate student to pursue the student's 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.
3. An internship is an experiential job placement designed to enhance the knowledge, skills, and abilities of a student and to enhance their employability. An internship 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.

Support from any of these sources is subject to terms of the funding source and to approval by The Graduate School. In addition, all holders of an assistantship, fellowship, or internship are responsible for associated fees.

Acceptance of Offers of Merit-based Support

The University of Connecticut supports the Council of Graduate Schools Resolution Regarding Graduate Scholars, Fellows, Trainees, and Assistants (see cgsnet.org/april-15-resolution). 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 the student and the University 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. An acceptance given or left in force after April 15 commits the student to first inform the program that they are withdrawing or resigning from the offer of financial support that they had previously accepted. 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.

General Requirements for Eligibility

Financial aid recipients must meet Satisfactory Academic Progress (SAP) requirements, which are based on federal regulations. These requirements include maintenance of an appropriate grade point average (3.0) and satisfactory completion of a percentage (67%) 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. The credit maximum for doctoral students is 144 attempted credits and the credit maximum for all other graduate students is 108 attempted credits.

Please visit financialaid.uconn.edu for more information related to the terms and conditions of financial aid.

Specific Requirements Related to Graduate Assistantships

To be appointed, to retain an appointment, or to be reappointed as a graduate assistant, 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 "Credit Loads" under Academic Regulations), 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 fewer than 10 hours per week. Because of the added workload associated with their assistantship duties, graduate assistants ordinarily take fewer courses per year than they otherwise would. In addition, because graduate assistants divide their full-time efforts between study and assistantship responsibilities, they may not hold concurrent employment outside the University without the written consent of their major advisor.

All graduate assistants in programs based at the UConn Health Center are awarded the same stipend. (Twelve-month rates for the UConn Health Center can be found at health.uconn.edu/graduate-school/admissions/financial-support/.) However, stipend rates for graduate assistants in programs based at Storrs or a regional campus, which can be found at payroll.uconn.edu, are based on levels that reflect progress toward the advanced degree and experience, defined as follows:

- **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, 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.

When a graduate assistant at Storrs or a regional campus becomes eligible for a Level 2 or Level 3 stipend, the student's department may request an increase by filing a new employment authorization effective after the student attains eligibility.

Tuition (but not fees) are waived for graduate assistants. 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 and 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).

The University requires that all students have health insurance. A graduate assistant is eligible for health insurance through the Connecticut Partnership Program. Graduate assistants should be aware that it is necessary to enroll in health insurance in accordance with the published deadlines. Health insurance does not take effect automatically. If a student has other health insurance and does not want the GA student health insurance plan, the student may waive the coverage by completing the "Graduate Assistants/ Interns Election/Waiver Form" in CORE-CT located at hr.uconn.edu/ga-health-insurance.

Academic Regulations

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 entering a graduate program 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. In addition, except under unusual circumstances or when conducting off-campus research or holding an off-campus internship or fellowship, students enrolled in on-campus programs must arrive on campus on or before the first day of classes in each academic term in which they are enrolled.

Credit Loads

Graduate students may enroll in up to 20 credits per semester. The specific 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. If a student has extenuating circumstances that require the student to take more than 20 credits, the major advisor must send a written request to The Graduate School for approval. In addition to courses offered within specific subject areas, a student's credit load may include GRAD 5950 (Master's Thesis Research), GRAD 6950 (Doctoral Dissertation Research), and other equivalent research courses defined by The Graduate School, as well as seminar and other "colloquium" courses that are not part of the plan of study.

Full-time vs. Part-time Status

A student may be classified as a full-time student in one of three ways: (1) enroll in nine or more credits (coursework or research); (2) enroll in six or more credits while holding a graduate assistantship; or (3) enroll in one of the following four special purpose three-credit courses: 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 holding graduate assistantships must register for six or more credits per semester. Such students are considered to be full-time students. 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.

A part-time course credit load is between 1 and 8.99 credits. To be classified as three-quarter time, the student's credit load must be greater than six and less than nine credits per semester. To be classified as half time, the student's 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. For various reasons, the University may need to provide the institutional consideration of a "part-time" credit load. These criteria apply to all registered students at the University. Note that the Non-Credit Registration courses (GRAD 5997, 5998, 5999, 6998, and 6999) 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.

Registration

Master's, doctoral, and certificate students must begin their programs with coursework and must maintain registration in 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 Registration courses.

Failure to maintain registration during the spring and fall semesters results in the student's inactivation. Reinstatement is possible (although not guaranteed) within a year of last registration and payment of a reinstatement fee. 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. Registration is not required during the summer or for the 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). Note, however, that 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 Procedures

Both new and continuing students should make appointments with their major advisors to determine the courses in which they plan to enroll. Courses selected shall be consistent with the student's objectives and related to the program in which the student is enrolled.

Dates for registration are published in the Academic Calendar. Whenever possible, all students in degree or certificate programs must register for courses using the Student Administration System and pay all tuition and fees either through the Office of the Bursar at bursar.uconn.edu or online using the Student Administration System. Non-degree students must register through the Office of the Registrar at nondegree.uconn.edu. Students encountering problems during registration (including enrollment in restricted courses) should contact the Office of the Registrar.

Auditing Courses

Students who do not wish to register for a course for credit may be permitted to register as auditors under the following conditions: (1) they pay the appropriate tuition and fees for the course; (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 Office of the Registrar. Courses audited are entered on the student's permanent record, but such courses cannot be used to fulfill requirements for a graduate degree or certificate 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 eleventh week of the semester.

Repeating Courses

A student may repeat a course, including a course that they have previously audited for credit or converted to pass/fail, once in order to earn a higher grade. However, 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.

When a student repeats a course, credit shall be allowed only once, i.e., 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 receive credit for both the course and the cross-referenced course.

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. The grade for the lower grade will remain on the transcript, but will 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 will continue to be included in the GPA and credit calculations.

Non-Credit Registration

Students who are not registered for courses for credit may maintain registration by registering for one of the following five non-credit courses: Continuous Registration at the certificate (GRAD 5997), master’s (GRAD 5998), or doctoral (GRAD 6998) level; Thesis Preparation at the master’s level (GRAD 5999); and Dissertation Preparation (GRAD 6999). Other zero-credit courses may be substituted, if appropriate. 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 enroll in one of these courses. The implications of enrollment in non-credit registration rather than credit courses are addressed in the “Credit Loads” section above. Note that, 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. Non-credit registration is granted with the consent of the student’s major advisor and the student’s international advisor. International students should consult with the office of International Student and Scholar Services prior to registering for non-credit courses. Non-credit registration requires payment of the associated University fees. Students may not add non-credit registration after the first day of classes if they were previously enrolled and attended any credit-bearing courses.

Graduate Schedule Revisions

Adding Courses

Students may add courses during the first 10 days of classes without special permissions. However, after the beginning of a semester or summer session, a student may not add a course if the instructor feels that the elapsed time might preclude its successful completion. In exceptional cases only, a student may add a semester course 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 Dean of The Graduate School or the Dean’s designee is also required for adding classes. 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 Office of the Registrar on a Student Enrollment Request form available at registrar.uconn.edu/forms. Note that section changes require the same authorization as other add/drop transactions.

Course seats are non-transferable. Students cannot transfer/sell their course seat(s) to any other student.

Semester Period	Permissions Required to Add a Class
First and second weeks of classes	None
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 of The Graduate School

Dropping Courses

During the first eleven weeks of a semester or prior to the midpoint of a summer session course, a student may drop a course by the following procedure. Students registered directly by the Office of the Registrar at Storrs must file a properly completed Student Enrollment Request form with the Office of the Registrar. This form is available on the Office of the Registrar website at registrar.uconn.edu/forms. Non-degree students register and drop courses through the Office of the Registrar at nondegree.uconn.edu. Non-degree students who wish to withdraw from a graduate-level course after the semester has begun must initiate a Voluntary Separation Notification form found at <https://grad.uconn.edu/graduate-students/voluntary-separation/>.

After the first eleven 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 written recommendation of the major advisor or program director, 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 Late Drop Petition form for the course(s) to be dropped. Under no circumstances is a student at any location or in any program permitted to drop a course after the course has been completed with a permanent grade posted.

No grade is recorded for courses officially dropped. However, when a student drops a course after the tenth day of the semester or after the first week of a summer session course, the course will remain on the student’s transcript with a mark of “W” recorded in the grade column to signify withdrawal.

Note that 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. In addition, dropping a course does not automatically remove the course from a plan of study, nor does approved deletion of a course from a plan of study cause registration in the course to be dropped. The procedures are separate and unrelated.

Semester Period	Permissions Required to Drop a Single Course
First and second weeks of classes	None (The course will not appear on the student’s transcript).
Third through eleventh weeks of classes	Advisor (The course will appear on the student’s transcript with a “W” grade).
After the eleventh week	Dean of The Graduate School; exceptions made only for extenuating circumstances (The course will appear on the student’s transcript with a “W” grade).

The general policies and procedures regarding dropping a course described above apply to dropping all courses, whether the student wishes to remain active in the 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. There are no bill adjustments unless all courses are dropped for the term and in such circumstances, the University’s Withdrawal Tuition and Fee Adjustment Schedule will apply.

Course Grades

Course Credit and Grades

Any student who is regularly registered for a course and who satisfies the course requirements shall receive credit for that 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. Note that course credit by examination is not allowed as a means of accumulating credits to meet the requirements for advanced degrees.

Instructors are required to file grades with the Office of the 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 uniform scale below is published to encourage general agreement on the meaning of grades. Students are required to maintain in their course program at least a “B” (3.0) average, for which a grade point average will be computed using the chart below.

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

Explanation	Final Grades	Grade Points
Distinction	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
Non-Credit Registration	R	N/A

Final grades of “S” (Satisfactory) or “U” (Unsatisfactory) are associated only with certain courses designated as such by the Executive Committee of The Graduate School. An “S” is a passing grade and is not computed into the student’s grade point average. A “U” is viewed as a failing grade and is grounds for academic dismissal. For more information, refer to the Termination of Status and Academic Dismissal section.

With permission of their major advisor, graduate students may convert any course, undergraduate or graduate, to a Pass/Fail basis. A course that has been converted to a Pass/Fail cannot be used to meet the requirements for a graduate degree or certificate and cannot be included on a student’s final Plan of Study. For graduate students converting a course to Pass/Fail, a passing grade is defined as a grade of C- or higher. Students who are selecting a course for the Pass/Fail option or want to convert a Pass/Fail back to a graded basis must do so by the eleventh week of the semester. For courses taught outside of the fall and spring semesters, these deadlines will be adjusted in a pro-rated fashion by the Registrar.

The grades “R,” “T,” and “W” on a transcript signify the following:

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.

Note that an official transcript of an individual’s graduate academic career includes grade point average calculations based on all coursework completed during the student’s graduate career (including any 1000-level courses). Plus and minus values that are assigned to grades are entered on the permanent record and are computed into the student’s grade point average. However, neither credits completed elsewhere and accepted in transfer by The Graduate School nor S/U or P/F grades affect the student’s University of Connecticut grade point average in any way.

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.

An instructor may assign one of the following temporary grades 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 Office of the 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 submit the final assessment (e.g., take the final examination) from the instructor as soon as possible.

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 is no longer 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. Failure to make satisfactory academic progress 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.

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 recalculate and, if warranted, change grades only for the following reasons: a computational error, clerical error, or 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 was taught will be notified of a grade change to ensure consistency.

Appeals of Assigned Course Grades

The Graduate School follows the grade appeal process adopted by the University Senate. Under that process, if a student believes that an assigned course grade is in error, the student has 10 working days from the posting of the grade or the last day grades are to be posted, whichever is later, to ask the instructor to review the grade. Allowable reasons for a grade change request comprise computational errors, clerical errors, and the discovery of overlooked components in a student’s body of work.

If the instructor does not respond to the student within five working days (or sooner if extenuating circumstances merit a more expedited review), the student should contact the department head in which the course is offered.

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 notifies the student that the original grade is correct, the student has 10 working days to appeal the decision to the head of the department in which the course is offered. The department head will seek

input from the instructor and the student to determine the merits of the grade appeal and provide a decision within 10 working days from date of the 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 that school/college's Faculty Grade Change Review Committee.

If the department head thinks that a grade change is justified but the instructor does not agree, the department head shall request, within 10 working days, through the dean of the school or college in which the course is taught, a review by that school/college's Faculty Grade Change Review Committee (FGCRC).

If, due to exigency, a grade appeal must be resolved and the standing FGCRC is not available, the dean or the dean's designee of the school or college will convene an ad hoc FGCRC of three full-time faculty members to hear the appeal.

The FGCRC should perform an administrative review to determine if there are sufficient grounds to proceed with an appeal hearing. If so, the FGCRC shall schedule a hearing within 10 working days of notification of a case. Both the student appealing the grade and the course instructor must be present, either in person or via electronic communication, at the hearing. The student will speak first and state the grounds for the grade appeal, followed by the instructor's response. Both parties must present supporting evidence related to the grade appeal and may request testimony of others. The FGCRC may request input from the department head.

If the FGCRC agrees (by a majority vote) that a grade change is warranted, the FGCRC chair will send a grade change notification to the registrar. If, however, the FGCRC does not agree that a grade change is warranted, the instructor's grade stands. The FGCRC's decision shall be considered final. The FGCRC 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 days of the decision.

Standards and Degree Requirements

The general academic standards and degree requirements of The Graduate School described here apply to all students enrolled in degree and certificate 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 requirements for their program, as specified in both this catalog and the relevant graduate program handbooks. Undergraduate and non-degree students taking a graduate course should consult the appropriate catalog for regulations that apply to them.

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

Grade 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. Whenever a student's cumulative average falls below 3.0, the student's performance is to be reviewed by the student's advisory committee to determine whether or not the student shall be permitted to continue graduate study. Conferral of a degree or certificate requires that the student have a cumulative grade point average of 3.0 for all courses listed on the final plan of study or advisement report.

The following grades are considered to be below the standard expected for graduate work:

- All "C" Grades, if directly within the student's field of study. A "C" grade (including a "C+" or "C-") may be considered acceptable if it is in a course in a supporting area that may be of benefit to the student and where the normal higher grade standard might discourage

inclusion of that coursework in the student's program. Such work shall be identified on the plan of study.

- All "D" Grades. A course in which a student received a "D" grade may not be included (or remain) on the student's 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": These grades necessitate a recommendation by the advisory committee to The Graduate School as to whether or not the student shall be permitted to continue graduate study.

Certificate Programs

A certificate from the University of Connecticut provides post-baccalaureate students with critical knowledge in a specific field or niche. A certificate is not a degree. Rather, it is a focused set of courses that, when completed, demonstrates competence in a coherent academic specialty. Students are awarded certificates based upon completion of a well-defined program of coursework. 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.

The University of Connecticut offers several types of certificate programs: graduate certificates, post-master's/sixth year certificates, and post-baccalaureate certificates. Post-master's/sixth year certificates that require 30 or more credits for completion follow rules and requirements that are similar to those of an equivalent master's degree (if one exists). Most other certificates require fewer than 30 credits (typically 12-15 credits). In a small number of cases where detailed justification has been provided, a certificate program may require as few as nine credits.

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.

UConn's certificate programs may be offered face-to-face, entirely online, or in a blended/hybrid format. Information about certificates that involve a substantial online component is available through UConn Online (online.uconn.edu). Detailed information concerning criteria and procedures may be obtained from certificate program coordinators.

A student may enroll in a certificate program on either a part-time or a full-time basis. If pursued on a full-time basis, many certificates can be completed in a single year. Students must complete the requirements for the certificate within three years of initial enrollment, or, for students who enroll in the certificate program while they are also pursuing a graduate degree at the University of Connecticut, within one year of either (1) the time the degree is awarded, or (2) the time allowed to complete that degree, if the student does not complete the degree within that timeframe. In all cases, with the approval of the Executive Committee of The Graduate School, programs can specify shorter time limits for completion of certificate programs. All coursework on the plan of study for the certificate must be within these time limits.

To be awarded a certificate, a student must satisfactorily complete the required credits with a cumulative grade point average of 3.0 or higher. Advanced coursework taken as a non-degree student or an undergraduate at the University of Connecticut may account for up to six of the course credits required for completion of the certificate, provided the grades earned in such coursework are within the time limit for completion of the certificate program requirements. These credits can include up to six credits used to meet the student's undergraduate degree requirements, provided the courses are graduate-level courses required for that certificate program or the courses have been approved for credit sharing for that program by the Executive Committee of The Graduate School. Non-degree coursework may be included on the plan of study only with the consent of the advisor. Credits earned at other institutions may not be used on a certificate's plan of study. Post-master's/sixth year certificate students refer to the Use of Transfer Credits from Other Institutions section.

Admission to a certificate program does not guarantee admission to a related degree program. However, if a student earns a certificate and is currently pursuing or 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 the student's advisory committee in the degree program and the director of the certificate program. 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.

In addition, 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.

Graduate Degree Programs: General Requirements

Time Limits

Students are 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.

Ordinarily, if pursued on a full-time basis, the master's degree can be completed within two years. 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 a doctoral degree can ordinarily be completed within five years, and must be completed within eight years of the beginning of the student's matriculation. Failure to complete the work within the specified time limit or failure to maintain registration will require re-evaluation of the entire program and may result in a notice of termination.

An extension of the student's terminal date is considered only when there is substantial evidence that the student has made regular and consistent progress toward completion of program requirements. A detailed recommendation to extend the terminal date must be signed by the major advisor and submitted to the Dean of The Graduate School for approval no later than one month before the student's current terminal date.

Plans of Study

To become a candidate for a graduate degree, the student must have a plan of study or advisement report that has been approved by their advisory committee or major advisor as appropriate for the degree program. 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. Successful completion (with a cumulative GPA of 3.0 or higher) of all work indicated on the approved plan of study or advisement report is a fundamental prerequisite to the conferral of the degree. In addition, except when a waiver is explicitly granted by the Dean of The Graduate School, all coursework (including coursework taken prior to matriculation) that is included on a student's final plan of study must be within the above time limits.

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 advisory committee may require that the student take an exploratory examination to guide the committee in formulating the plan of study. 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.

The plan of study shall consist largely of courses at the 5000 level or above. A limited number of credits at the 3000 or 4000 level (not more than six) may be included on a graduate degree plan of study. However, courses in the subject area UNIV cannot be used on a graduate plan of study.

In addition, the plan of study for a Plan A masters student must include nine credits of GRAD 5950 (Master's Thesis Research) or GRAD 5960 (Full-Time Master's Research). Similarly, the plan of study for a Ph.D. degree must include at least 15 credits and the Ed.D. degree must include at least nine credits of GRAD 6950 (Doctoral Dissertation Research) or GRAD 6960 (Full-Time Doctoral Research). Note that course credit by examination is not allowed as a means of accumulating credits to meet the requirements for advanced degrees.

Approved plans of study for master's degree programs must be submitted to the Office of the Registrar no later than the beginning of the student's final semester. Approved doctoral plans of study must be submitted to the Office of the Registrar no later than when 18 credits of coursework have been completed. Failure to present the plan of study 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. If an approved master's or doctoral plan of study has been submitted to the Office of the Registrar and a change is needed, an email outlining the changes and including the major advisor's approval should be sent to Degree Audit.

Use of Undergraduate/Non-degree Credits and Credit Sharing

Except in the case of officially approved dual degree programs or as explicitly allowed herein, credits on the plan of study or advisement report cannot have not been applied toward any other degree, at the University of Connecticut or elsewhere (already completed or to be completed in the future), including undergraduate degrees.

However, up to 12 credits of advanced coursework taken while a student is either an undergraduate or a non-degree student at the University may be included on a master's or doctoral plan of study or advisement report, provided such coursework is within the time limit for completion of the degree requirements. Inclusion of non-degree coursework on the plan of study requires the consent of the advisory committee. These 12 credits can include graduate coursework used to meet the student's undergraduate degree requirements at the University of Connecticut, provided (1) the courses are required courses for the graduate degree program (i.e., they are not electives), or (2) the courses have been approved for credit sharing for that graduate degree program by the Executive Committee of The Graduate School. Required courses include graduate courses that meet one of the following criteria: (1) the course is identified by course number as required of all students in the program, (2) the course is one of a limited number of courses (identified by course numbers) that can be used to meet a specific stated competency requirement for that program (e.g., a statistics requirement), or (3) for fields of study that fall entirely within a single academic department, the course satisfies a requirement that a student in that field of study take a specified number of credits of graduate coursework within that department.

Use of Transfer Credits from Other Institutions

A limited number of credits (up to 25 percent of the total credits required for a master's degree program and up to 30 credits for a doctoral degree) of letter-graded graduate level academic work completed at other accredited institutions may be accepted in transfer and included on a plan of study provided the following conditions are met: (1) the major advisor indicates 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 course is at a level appropriate for the student's graduate degree; (3) such coursework is within the time limit for completion of the degree requirements; and (4) the grade earned in the course is "B-" or higher. In addition, 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).

Certificate students may not use courses completed at other institutions to satisfy requirements for a University of Connecticut certificate program. However post-master's/sixth year certificates that require 30 or more credits for completion follow the rules for transfer credits if there is an "equivalent master's degree." An equivalent master's degree is one that has the same name and substantially similar requirements as the post-master's/sixth year certificates.

Official transcripts of any coursework to be transferred must be on file with the University. Once the approved plan of study is submitted to the Office of the Registrar 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.

Graduate Degree Programs: Master's Degrees

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 level (or its equivalent).

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.

Thesis and Non-Thesis Master's Degrees

The Graduate School requires a minimum of 30 credits for a master's degree, though some programs may require more.

Master's degrees may be earned under either of two plans, as determined by the advisory committee. The Thesis plan (Plan A) emphasizes research activities while the Non-Thesis plan (Plan B) requires comprehensive understanding of a more general character. The Thesis plan requires no fewer than 21 credits of advanced coursework and no fewer than nine additional credits of master's level 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. In addition, some programs require a comprehensive final examination. Advisory committees may also require the student to take other courses with or without graduate credit, depending on the student's objectives and previous preparation.

Students admitted to study for the degree of Doctor of Philosophy may earn a Master of Arts or Master of Science degree in the same or another field of study, under either the Thesis (Plan A) or the Non-Thesis Plan (Plan B) option by meeting all of the requirements for that degree, including filing a Master's Plan of Study for the degree that is based on courses that are not used on the student's Ph.D. Plan of Study.

Students may also apply for a Plan B master's degree in their Ph.D. field of study (if one is offered) if they meet all of the following requirements: (1) they have completed at least 30 credits of content coursework (i.e., any coursework other than GRAD 5950/5960 or GRAD 6950/6960) from a fully approved Ph.D. Plan of Study with no more than six credits being transfer credits from another university, (2) they have passed either a master's final examination or a doctoral General Exam in that field of study, and (3) they have been recommended by their major advisor or by the Dean of The Graduate School for award of the master's degree in that field of study. In this case, the courses used toward the master's degree can also be used on the student's Ph.D. Plan of Study.

Master's Thesis

For students following a Thesis plan, 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. The advisory committee indicates its approval of the thesis and satisfactory oral defense by completing and signing the Report on the Final Examination form (see below).

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 uconn.submittable.com, a University repository for public access. The final copy must meet all specifications outlined on the Office of the Registrar's website (registrar.uconn.edu). It is the student's ultimate responsibility to be certain that the thesis conforms to the required specifications.

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.

Master's 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 student may not take the final examination before Regular Status has been granted. 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 contents of the final examination are under the jurisdiction of the advisory committee. 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 other members of the faculty may attend. 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 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. After the examination, the major advisor shall communicate the results to the student. In addition, the Report on the Final Examination, indicating the result of the examination and the names of all faculty members participating, must be signed by the members of the advisory committee and submitted to the Office of the Registrar.

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 Office of the Registrar promptly, and any re-examination must take place within 12 months from the date of the original examination.

Graduate Degree Programs: Doctor of Philosophy (Ph.D.) 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. An individual may not earn more than one Ph.D. degree in a single field of study at this institution.

To earn a Ph.D., 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). Content coursework is defined as any coursework other than GRAD 5950/5960 and GRAD 6950/6960. Ph.D. students must also take at least 15 credits of GRAD 6950 (Doctoral Dissertation Research) or GRAD 6960 (Full-Time Doctoral Research). Some programs may also require Ph.D. students to fulfill a Foreign Language(s) or Related Area requirement.

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 has determined that the student has met the standard of independence of judgment and mature scholarship in the chosen field. The advisory committee has the flexibility to determine what is needed to meet this standard, provided (1) the standard meets the relevant minimum Graduate School requirements set forth in the Graduate Faculty Council by-laws and the program requirements set forth in the graduate catalog, (2) the standard is clearly articulated to the student prior to filing of the dissertation proposal, and (3) the standard is applied in an equitable and non-discriminatory way.

Ph.D. General Examination

All Ph.D. students are required to pass a Ph.D. General Examination. A student is examined in the several facets of their field of study, not merely in the particular area of concentration. The examination may be written, oral, or both. 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." The 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.

Normally, the General Examination is under the jurisdiction of the student's advisory committee. In this case, the final decision as to whether or not the student has passed the examination shall rest solely with the advisory committee. However, the members of the Graduate Faculty in a student's field of study can vote to assign authority to conduct and determine the outcome for all or part of the examination to a differently constituted examining committee. If a field of study has voted to assign authority over the General Examination to a different committee, the final decision as to whether or not the student passed the examination rests with that committee. In either case, a minimum of five faculty members must participate in the General Examination.

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 Office of the Registrar no later than the date of the submission of the approved Dissertation Proposal.

Dissertation Proposal

The Dissertation Proposal is to be prepared in consultation with the members of the advisory committee before the research is well underway. 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 student's department or program. 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. The evaluation may take the form of a reading of the proposal or attendance at an oral presentation and discussion of the proposal.

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 student has passed the proposal defense. 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 reviewers who are not members of the advisory committee (see the paragraph above), should be submitted to the Office of the Registrar by the time the student has completed the ninth credit of GRAD 6950 or 6960. In any event, the approved Dissertation Proposal must be on file in the Office of the Registrar before the public announcement of the oral defense of the dissertation. Approved Dissertation Proposals submitted to the Office of the Registrar will not be considered in good order without the inclusion of any required copyright, Institutional Review Board (IRB), Institutional Animal Care and Use Committee (IACUC), human stem cell approval granted by the Stem Cell Research Oversight (SCRO) Committee, or other required approvals. Receipt by the Office of the Registrar of the approved Dissertation Proposal and any required approvals are 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, 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 for completion of the degree. 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. Although a dissertation should provide evidence of a student's ability to make significant research contributions in their field, it may contain work done in collaboration with others (including other students), provided the student has played a major role in the work and subject to the approval of the advisory committee. Proper acknowledgment of authorship should be included in the dissertation. Specifications for its preparation may be obtained from the Office of the Registrar's website. It is the student's ultimate responsibility to be certain that the dissertation conforms to the required specifications.

The oral defense of the dissertation must be announced publicly by means of the University's online Events Calendar at least two weeks prior to the date of the defense. 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 dissertation defense 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 dissertation defense, the major advisor communicates the results to the student and verifies that the official report has been completed and signed for submission to the Office of the Registrar (or to the UConn 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. All members of the student's advisory committee must approve the final version of the dissertation. The Graduate School requires the electronic submission of the dissertation through uconn.submittable.com, a University repository for public access. The final copy must meet all specifications outlined on the Office of the Registrar's website. 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 all requirements for the degree have been completed satisfactorily by the deadline specified in the Academic Calendar. Degrees are conferred three times each year: August, December, and May. However, graduate commencement ceremonies are only held once per year (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's website under the section titled Graduation. If all required paperwork and submissions needed for conferral are not received by the Office of the Registrar by the deadlines published in the Academic Calendar, conferral is delayed to the next conferral period, even though all other degree requirements may have been completed on time.

Commencement

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 Commencement website: commencement.uconn.edu.

Policy on Leave of Absence from Graduate Studies

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 two semesters. The request for a leave of absence must be made using the Voluntary Separation Notification form on The Graduate School's website.

The request requires approval from the student's major advisor and the department or program head. The completed application 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 leave of absence must address the specific reason(s) prompting the request. Examples could include, but are not limited to, physical and/or mental health issues, family leave and financial hardship. Students requesting a health-related leave of absence should not submit medical documentation to The Graduate School. 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 all degree requirements must 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 and 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 information about refunds and cancellation of charges found in the Tuition and Fees section of the catalog applies to students taking an approved leave of absence.

International students are strongly encouraged to evaluate thoroughly the implications of any decisions 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 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 two additional semesters. The request must be resubmitted using the previously described procedures, and ultimately approved by The Graduate School. A leave of absence cannot exceed four semesters in duration. In cases in which a student needs leave for more than four semesters, 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 the student upon the student’s 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. A student may be terminated for either of the following: (1) failure to have a major advisor, or (2) failure to complete degree requirements within the required time limit.

Once a student’s plan of study has been approved, 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 graduate student and the major advisor must always be cognizant of the time limits associated with the student’s degree. Any request to extend the date by which requirements must be completed must be submitted in writing to The Graduate School using the *Request for Extension of Terminal Date for Degree Requirements form*, which must include an explanation and 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 in the Appeal and Hearing Procedures. If the termination stems from resignation of an advisor and failure to identify a new advisor, the student can appeal only on the grounds that the department or program did not make reasonable efforts to find a new major advisor for the student.

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 failure to satisfy any requirement of the student’s graduate degree program, including failure to maintain adequate academic progress. This could include one or more of the following:

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. Failure to satisfy a foreign language or related area requirement for a degree;
4. Failure of the doctoral General Examination;
5. Failure to produce an acceptable Doctoral Dissertation Proposal;
6. Unsatisfactory performance in any aspect of the research or writing for a required master’s thesis or doctoral dissertation;
7. Failure of a final examination for the master’s or doctoral degree.

The advisory committee submits the written recommendation for academic dismissal to The Graduate School 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. The department head or designee for the program in which the student is enrolled must endorse the recommendation of the committee and document the reasonable attempts that have been made to find the student a pathway to completion. Whenever a student is dismissed on academic grounds, the student receives notice from The Graduate School. The student may appeal the dismissal under the provisions outlined in the Appeal and Hearing Procedures section.

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.

Major Advisors

Each student in a graduate degree program must have a major advisor. A major advisor must be appointed to the Graduate Faculty at the appropriate level by the Dean of The Graduate School, by authorization of the President of the University, to advise students at that level in a particular field of study or area of concentration. Since consistency of direction is important, a durable relationship between the student and the major 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).

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. 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 Office of the Registrar. The Change of Graduate Major Advisor form can be found on the Registrar's website at registrar.uconn.edu.

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.

A member of the University of Connecticut faculty who has recently retired from active service or left the University without retiring may continue to serve on a student's advisory committee (as a major or associate advisor) with the endorsement of the appropriate department head or program director, based on a reasonable expectation that the person will be able and willing to remain actively engaged in advising the student through the remainder of the student's program. In addition, a retired member of the Graduate Faculty may be considered for appointment as major advisor for a newly-admitted master's or doctoral student with the endorsement of the appropriate department or program head, based on substantial evidence of ongoing research and scholarly activity in the field. Separate application is required for each student for whom a faculty member who is no longer in active service at the University wishes to serve (or continue to serve) as major advisor. Such appointments are made by the Dean of The Graduate School with the advice of the Executive Committee.

If for any reason a major advisor intends to resign from their role as major advisor, they must concurrently send a notification of the intent to resign to the student, the student's department head or program director, and The Graduate School. The notification should include a date when the resignation is expected to become effective and a brief explanation of the circumstances or reasons that have led to the intended resignation. Whenever possible, the effective date should be at least 30 business days after the date of notification. The department head or program director must then work with the student, the major advisor, and the advisory committee to identify a new major advisor, making all reasonable efforts to identify such a person, and report the outcome of this process to The Graduate School within 30 business days of the notification of intent to resign. This outcome would normally be one of the following:

1. a suitable new major advisor has been found;
2. the current major advisor has withdrawn the intention to resign and will remain as the student's major advisor;

3. the department or program has determined that the student is not academically qualified to remain in the program and is therefore recommending dismissal of the student; or
4. the department or program has determined that the student is academically qualified to remain in the program but, despite reasonable efforts by all parties to find a new advisor, a new advisor cannot be found and therefore the department or program recommends termination of the student.

When the intended 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. When resignation of a major advisor results in termination or dismissal, the student may appeal the dismissal or termination under the provisions of the Appeal and Hearing Procedures.

Advisory Committees

Unless a field of study has established another advisory system, a student must also have an advisory committee. The advisory committee is formed after consultation between the major advisor and the student. The advisory committee must include at least two associate advisors, one of whom must hold a current appointment to the Graduate Faculty at the appropriate level in the student's particular field of study or area of concentration. An associate advisor must possess suitable academic or scientific credentials in the student's field of study. 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. 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 a 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. 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.

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. Students' advisory committees are accountable directly to the Dean of The Graduate School.

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 is no more than one negative vote, although the major advisor must always vote in the affirmative. For Ph.D. students, 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 unanimous.

Scholarly Integrity and Misconduct

Scholarly activity at the graduate 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 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 by the University’s Academic, Scholarly, and Professional Integrity and Misconduct Policy, is governed by the Student Code, which is administered under the direction of the Division of Student Affairs. Enforcement of its provisions is the responsibility of the Director of Community Standards (for undergraduate students), The Graduate School (for graduate students), and the Office of the Vice President for Research (for research misconduct). Identified misconduct will be routed to the appropriate unit. At the Health Center, student misconduct other than scholarly misconduct is governed by the Health Center Rules of Conduct.

If a graduate student accused of scholarly misconduct is part of a dual degree program where different policies regarding academic misconduct might apply, the Dean of the Graduate School, in conjunction with the dean(s) 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.

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 dual degree program, where different policies regarding academic misconduct might apply, the Dean of The Graduate School, in conjunction with the dean(s) 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 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 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 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 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 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).

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 an alleged violation will be the applicable procedures for that case.

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 within the program, department, and/or school/college. Assistance is also available through the University Ombuds at 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 graduate student(s) filing the appeal to attempt a prior resolution. Categories of actions or academic consequences that an appeal might address include, but are not limited to, academic dismissal and termination of status.

Pursuing Dispute Resolution through The Graduate School

To begin the formal dispute resolution process through The Graduate School, the graduate student should submit an appeal form (See “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 Associate Dean of The Graduate School who will serve as the hearing officer.

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. An appeal may be referred to a hearing if it is clear that a good faith effort to reach an acceptable resolution has been attempted but failed. The appeal process does not cover appeals regarding individual course grades. Such appeals should follow the process for appealing a final course grade as described in the University Senate By-Laws, which is endorsed by The Graduate School. Note that the hearing officer may at their sole discretion determine that an 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 disputes. Should the hearing officer determine that the appeal should be addressed through other procedures, they will notify the parties involved and refer the appeal to the appropriate University officials. The hearing officer’s decisions about whether the case should be referred to a hearing through The Graduate School will be communicated within 25 days of the date on which the student submitted the written complaint/appeal.

If the case is forwarded to a 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.

Filing an Appeal

A graduate student may file an appeal with The Graduate School when they disagree 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 include, but are not limited to, those listed below:

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

Individual grade appeals are not governed by this appeal process. The Graduate School endorses the process for appealing a final course grade as described in the University Senate By-Laws. However, requests to extend the deadline for filing a grade appeal in any course may be submitted to the Dean of The Graduate School. Information regarding this process can be found in the “Appeals of Assigned Course Grades” section of the University Senate By-laws, available at senate.uconn.edu.

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, a description of a plan for removing barriers to successful program completion.

Timeline for filing an appeal:

1. Submit the 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 described below.

Consistent with the University’s Non-Retaliation Policy at policy.uconn.edu, retaliation against any person who makes or participates in an appeal under this policy is strictly forbidden.

Graduate Hearing Procedure

For cases forwarded for the consideration of a 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).

The hearing committee will be composed of three voting members (two members of the graduate faculty and one graduate student). The hearing officer 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.

Both the complainant and respondent may each invite one person to attend the hearing as a support person and may consult their support person throughout the hearing. However, a support person 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.

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.

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 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.

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 an appropriate course of action(s) to be implemented by The Graduate School.

The decision of the hearing committee 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.

Accommodations for Students with Disabilities

1. By federal law, a person with a disability is any person who: 1) has a physical or mental impairment; 2) has a record of such impairment; or 3) is regarded as having such an impairment, which substantially limits one or more major life activities such as self-care, walking, seeing, hearing, speaking, breathing, or learning.
2. A student requesting an accommodation in regard to a hearing must follow the appropriate process for requesting an accommodation through the Center for Students with Disabilities. The Center for Students with Disabilities will make a determination regarding the request and notify the appropriate parties.
3. Reasonable accommodations depend upon the nature and degree of severity of the documented disability. While the Americans with Disabilities Act of 1990 requires that priority consideration be given to the specific methods requested by the student, it does not imply that a particular accommodation must be granted if it is deemed not reasonable and other suitable techniques are available.

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.

Degree Programs

Accounting (M.S.)

The Master of Science (M.S.) in Accounting program is a fully online program 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 for C.P.A. (Certified Public Accountant) licensing. The program may be completed on a part-time or full-time basis. Students must complete 30 credits to fulfill all degree requirements. The Advanced Business Certificate in Accounting Analytics is also available to M.S. in Accounting students.

Required Course: ACCT 5505.

Approved Electives: (27 credits required) ACCT 5122, 5124, 5243, 5260, 5327, 5532, 5533, 5535, 5543, 5545, 5546, 5549, 5553, 5554, 5555, 5557, 5559, 5563, 5570, 5571, 5575, 5582, 5583, 5584, and 5894.

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).

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. and Ph.D. degrees in Animal Science offer several areas of concentration within the Animal Science Field of Study: Animal Genetics and Genomics, Stem Cell and Regenerative Biology, Animal Physiology, Meat Science, 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. 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 21 credits must include advanced coursework, with no more than three of these credits coming from independent studies or ANSC 5692. A minimum of nine credits must include GRAD 5950 or 5960.

Required Courses. ANSC 5693 and 5694. 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.

Final Exam. After completion of all required courses and the research component, the student is required to give a formal presentation of their work. The presentation is open to all faculty members in the department and can be scheduled as part of the departmental seminar series. Following the presentation, the Graduate Advisory Committee will administer a final examination. The format of this examination is at the discretion of the major advisor and the Graduate Advisory Committee, and its purpose is to assess the student's understanding of the area that they have emphasized. The final examination must be completed no later than one year after completion of coursework.

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.

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. In addition to course work, satisfactory completion of at least 15-credits of GRAD 6950 or 6960.

General Exam. 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 Graduate Advisory Committee and submitted to the Office of the Registrar no later than the date of the submission of the Dissertation Proposal (see below).

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 Office of the Registrar for final approval by the time the student has completed the ninth credit of GRAD 6950 or 6960. The approved Dissertation Proposal must be on file in the Office of the Registrar before the public announcement of the oral defense of the dissertation, but it is highly advisable to complete the dissertation proposal 12 to 18-months in advance.

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, primary research manuscript, suitable for peer-reviewed 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.

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 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. In addition,

UConn undergraduates who receive a B.S. degree from the Department can earn the M.S. degree through a 4+1 fast-track (accelerated) program. 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). Coursework includes the six credits from the M.S. common core (ARE 5201 or ECON 5201 and ARE 5311). 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). Coursework includes the six credits from the M.S. common core (ARE 5201 or ECON 5201 and ARE 5311). Students must complete three to six credits of ARE 5499 associated with writing the major paper. The grade for the independent study shall be issued after public presentation of the written paper. The additional 18 – 21 credits to complete the required 30 may include a maximum of up to six credits of ARE 5499 and/or 5991.

Plan B (Coursework). Coursework includes the six credits from the M.S. common core (ARE 5201 or ECON 5201 and ARE 5311). The additional 24 credits to complete the required 30 may include a maximum of up to six credits of ARE 5499 and/or 5991.

The 4+1 (Fast-Track) Program: This fast-track to the M.S. is designed for students who receive their B.S. degree from the ARE Department and then go on to pursue the M.S. in Applied and Resource Economics. The program is designed to allow students who enroll in graduate school in the summer following completion of their B.S. to complete all requirements for the M.S. within one calendar year. To complete the degree in this accelerated timeframe, the 120 credits students take for their B.S. should include six graduate credits of required courses (ARE 5201 or ECON 5201, and ARE 5311) that can be included on the student's undergraduate plan of study and also applied to the M.S. requirements of 30 credits. Once students earn their B.S., they must take 24 more M.S. credits, following one of the three plans of study described above. Students pursuing a Plan A or Plan B (Major Paper) plan of study will take up to six credits of GRAD 5950 (for Plan A) or ARE 5499 and/or 5991 (for Plan B (Major Paper) during the summer between the 4th and 5th year, working to develop an applied project or thesis with a faculty advisor. Students pursuing a Plan B (Coursework) plan of study will take up to six credits of approved electives during that summer.

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 18 credits of core conceptual courses, eight credits of Practical Coursework Options (including workshops, laboratory or research courses), and seven credits of professional master's cohort courses (communication skills, Frontiers seminars, business practices, internship). In special circumstances the Advisory Committee may waive some of these requirements.

Conceptual Courses. A total of 18 credits chosen from MCB 3211, 3219, 4026W, 4211, 5003, 5008, 5012, 5013, 5014, 5200, 5217, 5240, 5250, 5255, 5280, 5284, 5454, 5471; PHRX 3001, 5681, 5895; PHAR 5471, 5472, 6455; PNB 3260; or another course with prior approval from the Applied Biochemistry and Cell Biology Program Director.

Practical Coursework Options. Eight credits required. These credits must be selected from MCB 5427, 5430, 5670, 5671, 5672, 6897; MCB 5895 when taught as: Introduction to Flow Cytometry, Introduction to Microscopy, Practical Applications of Cell Culture, Multimode Plate Reader, Protein Purification, Molecular Graphics, Ligand Binding; or another course with prior approval from Applied Biochemistry and Cell Biology program director.

Professional Master's Cohort Courses. A minimum of seven credits required. These must include MCB 5490, two credits of MCB 5491, MCB 5900, and an internship (e.g. GRAD 5930). Other possible classes include MCB 5910; MCB 5080; 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 one course from the following options: STAT 5361 or MATH 5637; 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). 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, 5284, 5426, 5445, 5452, 5454, 5471, 5681, MCB 5895 when taught as Concepts of Genetic Analysis; MCB 5884; EEB 5333, 5348, 5349, 5449; KINS 6094 when taught as Inherited Metabolic Disorders; PHAR 4000, 5471, 5472, 6455, PHAR 6484; PLSC 3230; PNB 3260, 5350, 5395; 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. These must include MCB 5490, two credits of MCB 5491, MCB 5900, and an internship (e.g. GRAD 5930). Other possible classes include MCB

5910; MCB 5080; 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). 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; PATH 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. These must include MCB 5490, two credits of MCB 5491, MCB 5900, and an internship (e.g. GRAD 5930). Other possible classes include MCB 5910; MCB 5080; 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.

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 Leadership and Cultural Management (M.F.A.)

Formerly offered as Arts Administration

The Master of Fine Arts (M.F.A.) in Arts Leadership and Cultural Management is offered through the School of Fine Arts. The degree requires a minimum of 60 credits and is designed to be completed in three years. The program trains individuals for leadership and management positions in non-profit, for profit, and public enterprises in the arts and culture sector. Divided into two main parts the program includes a core curriculum, which all M.F.A. students are required to take, and advanced research and training in each student's chosen area of interest and expertise within the general field of Arts Leadership and Cultural Management. Examples of areas of specialization include: Fundraising and Development, Marketing, Community Engagement, Policy, Advocacy, Project and Program Management, and Leadership.

Core Requirements: DRAM 5110, 5111, 5112, 5113, 5114, 5115, 5116, 5117, 5118, 5120, 5121, 5122, 5123, 5124, 5125; PP 5328; and six credits of electives.

Athletic Training (M.S.)

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, student's complete coursework to advance their knowledge in evidence-based athletic training clinical practice while completing three 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 58 credits including each of the following courses: KINS 5100, 5101, 5102, 5103, 5106, 5107, 5109, 5110, 5111, 5112, 5200, 5201, 5202, 5204, 5205; PT 5410, 5412.

Biodiversity and Conservation Biology (M.S.)

The M.S. in Biodiversity and Conservation Biology is a non-thesis, coursework-based (Plan B) Master's degree for students preparing for careers in biodiversity management, conservation, and environmental education who want graduate-level training in the subject without the extensive research of a thesis-plan Master's degree. For students with a B.S. in Ecology and Evolutionary Biology (EEB) from the University

of Connecticut, it is designed as an accelerated (fifth-year) M.S. degree; such students can apply 12 credits of graduate coursework required for the M.S. towards the B.S. as well. Students who have completed a B.S. in another program must complete course requirements equivalent to the undergraduate EEB major to earn this M.S. degree. The M.S. 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.

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.

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 or 5960; 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 or 5960; 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. STAT 5625/BIST 5625 can be used to satisfy the Experimental Design Course with Biostatistics requirement and BME 5000 to satisfy engineering or life science course requirement, even if these courses were used on a UConn undergraduate Plan of Study.

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 courses (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. STAT 5625/BIST 5625 can be used to satisfy the Experimental Design Course with Biostatistics requirement and BME 5000 to satisfy engineering or life science course requirement, even if these courses were used on a UConn undergraduate Plan of Study.

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 or 5960; 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 or 5960; 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. STAT 5625/BIST 5625 or BME 5000 can be used to satisfy the elective requirement, even if the course is used on a UConn undergraduate Plan of Study.

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. STAT 5625/BIST 5625 and BME 5000 can be used to satisfy an elective requirement, even if these courses were used on a UConn undergraduate Plan of Study.

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.

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. The Ph.D. in Biomedical Engineering does not have a related area or foreign language requirement.

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 six 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 or 6960 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. STAT 5625/BIST 5625 can be used to satisfy the Experimental Design Course with Biostatistics requirement and BME 5000 to satisfy engineering or life science course requirement, even if these courses were used on a UConn undergraduate Plan of Study.

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 or 6960 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. STAT 5625/BIST 5625 can be used to satisfy the Experimental Design Course with Biostatistics requirement and BME 5000 to satisfy engineering or life science course requirement, even if these courses were used on a UConn undergraduate Plan of Study.

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.

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: Systems Biology, 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. All students (except dual degree students) in the Ph.D. program must also take MEDS 6501 and 6502.

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 5091 or 5092, 5215, 5225; BIST 5505–5605; BIST 5585–5685; BIST 5625, 5635.

Required Electives: One of the following courses: BIST 5615, 5645, or 5655. One additional course: BIST 5515, 5615, 5645, 5655, 5705, or 5815.

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 M.S. in Biostatistics student must first clear the Ph.D. Qualifying Examination.

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

Effective for the 2022-23 catalog, the MGMT subject area was changed to MENT.

Students must meet the Graduate School requirements, as well as the following requirements to complete graduate programs in the School of Business. The 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.), Master of Arts in Latina/o and Latin American Studies, Juris Doctor (J.D.), Medical Doctor (M.D.), Master of Science in Nursing (M.S.), Pharmacy Doctor (PharmD.), Master of Social Work (M.S.W.), and Ph.D. in Biomedical Science.

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.

Executive M.B.A.

Students must have prior managerial experience and complete 42 credits of graduate-level Executive Master of Business Administration (EMBA) courses as part of a lockstep cohort over 21 months. Students may elect to complete an additional 12 credits to earn a graduate certificate.

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

The M.B.A. program prepares students for management positions and career pathways towards business leadership. Courses cover the broad functional domains of business and their strategic integration. Courses are offered in a variety of delivery modes, from fully online to fully in-person, with flexibility in scheduling and time to completion.

M.B.A. students complete 42 credits at their own pace, which averages two years to completion. The curriculum includes 27 credits in required core courses and 15 elective credits. Students can complete their degree in-person and online out of Hartford, Stamford, or Waterbury, or completely online in Online Fast (cohort model) or Online Flex (student chooses classes each semester like in the on-ground model). Online students will be required to access all course material online and will need reliable internet access to complete the requirements of the program. Concentrations are available in Business Analytics, Business Ethics and Compliance, Finance, General Business, Management, and Digital Marketing Strategy.

Required Courses: ACCT 5121, BLAW 5175; FNCE 5101, 5151; MENT 5138, 5800; MKTG 5115; OPIM 5110 and 5185.

Elective Requirements: Students complete 15 credits of graduate level elective courses.

Concentrations: MBA students may complete their degree with a General Business concentration by taking any M.B.A. electives of their choice or take three electives (nine credits) in any of the following areas to develop a concentration: Business Analytics, Business Ethics and Compliance, Digital Marketing Strategy, Finance or Management. These are in addition to the required core courses listed above.

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: MENT 5620; OPIM 5270, 5272, 5601, 5603, 5604, 5641, 5668, 5671 and 5770, totaling 28 credits.

Approved Electives: (nine credits required) OPIM 5501, 5502, 5503, 5504, 5505, 5506, 5507, 5508, 5509, 5510, 5511, 5512, 5894; or approved graduate level (5000 or above) MKTG, MENT, or FNCE courses; HCMI and/or MATH courses approved for concentrations.

Concentrations: If the electives that a student chooses fulfill the requirements of a concentration listed below, the student's transcript will list the concentration in addition to the MSBAPM degree. The concentrations are optional, and students do not have to do any concentration if they choose not to. Substitutions to the courses that fulfill the requirements of the concentrations can be approved by the OPIM department head in consultation with other departments, as necessary.

Business Data Science Concentration: three courses from OPIM 5501, 5502, 5504, 5509, 5511, 5512.

Marketing Analytics Concentration: MKTG 5115 plus two courses from MKTG 5220, 5250, 5251, 5665; OPIM 5510.

Actuarial Science Concentration: three courses from MATH 5630, 5631, 5637, 5639.

Talent Analytics Concentration: MENT 5680, 5377, plus one course from MENT 5650, 5674, 5675.

Health Care Analytics Concentration: three courses from HCMI 5240, 5243, 5686; OPIM 5508.

Supply Chain Analytics Concentration: three courses from OPIM 5110, 5111, 5112, 5113.

Accelerated Master of Science in Business Analytics and Project Management. Prospective undergraduate UConn students must apply to the Accelerated Master of Science in Business Analytics and Project Management 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 Accelerated Master of Science in Business Analytics and Project Management 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 Accelerated Masters are required to complete 30 credit hours, having completed seven of the required credits to attain admission to the MSBAPM program.

Business Research (M.S.)

The M.S. in Business Research provides training in business theory and methods, combined with core courses in the department's program of study. It is available only to students enrolled in the Ph.D. Program in Business Administration at the time of application.

Requirements: (1) Successful completion of all coursework required for the student's concentration area, with the exception of 15 credits of GRAD 6950, at least 37 credit hours, (2) a cumulative GPA of 3.3 or higher, and (3) approval for the M.S. in Business Research by the student's Plan of Study Committee.

Credits used to fulfill the M.S. in Business Research degree cannot be used toward Ph.D. degree requirements in business. The Ph.D. general examination requirements need not be satisfied for the award of M.S. in Business Research. This degree is non-thesis track. Application for the degree can occur during the student's final semester enrolled in the Ph.D. program, subject to final GPA evaluation.

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 5th 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. The Ph.D. in Chemical Engineering does not have a related area or foreign language requirement. Students should register for the seminar series each semester it is offered.

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. The Ph.D. in Chemistry does not have a related area or foreign language requirement.

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.

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. The Ph.D. in Civil Engineering does not have a related area or foreign language requirement.

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 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 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.

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 Convergence Institute for Translation in Regenerative Engineering 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 take an independent study (CLTR 5099) in place of an elective.

Elective Courses: A total of nine elective credits are required. Students choose from a list of approved courses. Approved electives include: CLTR 5360; MEDS 5308, 5310, 6447; PUBH 5404, 5405, 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.

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 remainder of the student's program will be determined by their chosen specialty area. A minimum of 30 credits in total (including core courses and thesis- or project-related courses, if applicable) must come from graduate-level COMM courses. Students must culminate their M.A. program by either writing a thesis, taking a comprehensive examination, or completing a Capstone Project (COMM 5979). The choice among these options is made in consultation with and subject to the approval of the student's major advisor. Students pursuing a UConn undergraduate B.A. degree in Communication and who enroll in the accelerated M.A. program can apply to use up to 12 credits of graduate-level coursework taken as an undergraduate towards an M.A. degree in Communication.

Doctor of Philosophy in Communication

All students must complete a program of study of at least 60 credit hours of graduate course work, which includes dissertation credits. Required coursework varies depending on the chosen track, but all students must complete several core courses. Core courses are COMM 5001, 5002, 5003, and 5010. 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 6-9 credits in an area chosen to provide breadth or specialized skills. Students must pass COMM 6800, which entails participating in two research projects mentored by faculty. 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.

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 nine 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 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 5050, 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 5050, 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. The Ph.D. in Computer Science and Engineering does not have a related area or foreign language 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 ≥ 23 , IELTS speaking score ≥ 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.

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 Sixth-Year Certificates 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 Multicultural Education, Elementary Education, Music Education, Literacy Specialist Program (M.A.) or Reading Education (Ph.D.), and Secondary Education

with one of the following concentrations: English Education, World Language Education, History and Social Studies Education, Mathematics Education, and Science Education. The M.A. degrees in Reading and Language Arts Consultant and Remedial Reading, World Language Education, and Bilingual and Multicultural Education 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 Concentrations in Elementary Education or Secondary Education. Secondary Education includes: English Education, World Languages Education (American Sign Language, French, German, Italian, Latin/Classics, Mandarin Chinese, or Spanish), History and Social Studies Education, Mathematics Education, and Science Education (Biology, Chemistry, Earth Science, General Science, or Physics). Required Courses: 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, 5705, 5715, 5720, 5740, 5742, 5750, 5875, 5890, 5895, CLCS 5306, or GERM 5305. Three credits of EDLR 5015. One credit of EPSY 5221. Required courses should total 22 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.

Integrated Bachelor's/Master's (IBM) with Concentration in 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, 5705, 5715, 5720, 5740, 5742, 5750, 5875, 5890, 5895, CLCS 5306, or GERM 5305. 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)

Agricultural Education (PK-12) and Secondary Education (Grades 7-12). Secondary Education includes: English Education, World Language Education (American Sign Language, French, German, Italian, Latin, Mandarin Chinese, or Spanish), History and Social Studies Education, Mathematics Education, or Science Education (Biology, Chemistry, Earth Science, General Science, or Physics). Plan B (Non-Thesis) Required Courses: EDCI 5050, 5055, 5060, 5065, 5070, 5080, 5085, 5092, 5825, 5830, 5875; nine credits of EDCI 5090; three credits of EDCI 5830; EPSY 5108. Required courses total 45 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).

Master's of Arts Concentrations Outside of Initial Teacher Certification Programs

Concentrations in Bilingual and Multicultural Education, Elementary Education, Literacy Specialist Program, Music Education, or Secondary Education Required Courses: Three courses from the following two areas, with at least one course from each area, totaling nine credits. EDCI/HRTS (Social Justice/Human Rights) EDCI 5700, 5875, 6860. Learners: 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 Multicultural 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.

Literacy Specialist Program: EDCI 5100, 5105, 5110, 5115, 5120, 5125, 5130, 5135, 5140, 5145, 5150, 5250.

Music Education: EDCI 5040, 5041, 5042, 5043, 5044, 5047.

Secondary Education English Education: EDCI 5125, 5135, 5140, 5250, 5255.

Secondary Education STEM: 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 Curriculum and Instruction Doctor of Philosophy (Ph.D.) program offers nine concentrations: Bilingual and Multicultural Education, Elementary Education, English Education, Mathematics Education, Reading Education, Science Education, Secondary Education, Social Studies/History Education, World Language Education. 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.

Data Science (M.S.)

The University of Connecticut offers a Master of Science in Data Science through The Graduate School with the participation of the College of Agriculture, Health, and Natural Resources, the College of Liberal Arts and Sciences, the School of Business, the School of Engineering, and the Neag School of Education. The following areas of concentration are offered: Advanced Data Analysis, Bioinformatics, Biostatistics, Business Data Science, Cloud Computing, Cybersecurity, Dependent Data Analysis, Geospatial Analysis, Healthcare Analytics, Marketing Analytics, Social and Behavioral Analytics, and Talent Analytics.

Requirements: Students must compete at least 30 credits of coursework, including core courses, a capstone course, and additional coursework in an area of concentration or approved by the Academic Director of the program.

Core Courses: All students are required to complete the following 18 credits of core courses: STAT 5405, CSE 5713, EPSY 5641 (two credits), ARE 5353 (two credits), STAT 5125, OPIM 5501 (two credits), and CSE 5819.

Capstone Requirement: In addition, all students must complete a three-credit applied capstone course, GRAD 5800. If an area of concentration offers an applied capstone course specific to that area of concentration, that course will replace GRAD 5800 as the required capstone course.

Additional Credit Requirements: Students who elect not to pursue one of the areas of concentration listed below must complete an additional nine credits of coursework relevant to data science and approved by the Academic Director of the program. Students who choose an area of concentration

must complete nine credits of coursework in that area of concentration, as described below.

Advanced Data Analysis: nine credits chosen from STAT 5415, 5665, 5675, 5915.

Bioinformatics: nine credits chosen from CSE 5800, 5815, 5840, 5860.

Biostatistics: The following nine credits: BIST 5615, 5625, 5645. In addition, students in the Biostatistics area of concentration must take STAT 5915 as an applied capstone course (in lieu of GRAD 5800).

Business Data Science: nine credits chosen from: OPIM 5501, 5502, 5504, 5509, 5511, 5512.

Cloud Computing: nine credits chosen from: CSE 5299, 5300, 5304, 5309.

Cybersecurity: The following nine credits: CSE 5850, 5852, 5854.

Dependent Data Analysis: The following nine credits: BIST 5815; STAT 5825, 5915.

Geospatial Analytics: The following six credits: NRE 5525, 5585. In addition, students must take one of the following: NRE 5215, 5235, 5545, or 5560.

Healthcare Analytics: nine credits chosen from: HCMI 5240, 5243, 5686; OPIM 5508.

Marketing Analytics: MKTG 5515, and six credits chosen from: MKTG 5220, 5250, 5251, 5565; OPIM 5510.

Social and Behavioral Analytics: The following nine credits: EPSY 5643, 6611, 6615.

Talent Analytics: The following six credits: MENT 5377, 5680. In addition, students must take one of the following: MENT 5650, 5674, 5675.

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 only offered to individuals who are concurrently pursuing advanced dental education in one of the residency certificate programs offered by the School of Dental Medicine. Advanced dental education coursework is required to fulfill M.Dent.Sc. degree objectives.

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.

Digital Media 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 Design

The program is a customized, three-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 fine art, technology, science, and the humanities. The program is designed for the graduate student with a demonstrated background in digital media/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 have the opportunity to engage in collaborative projects with both industry partners and top researchers across the university. The M.F.A. in Digital Media 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, Digital Humanities/Social Sciences, STEM, Business, 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 DMD specializations: (3D Animation, Digital Culture, Digital Film/Video Production, Digital Media Business Strategies, Game Design, Motion Design & Animation, or Web/Interactive Media Design) or in an interdisciplinary capacity across the DMD specializations.

M.F.A. Requirements: The Master of Fine Arts in Digital Media Design requires a three-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, ARTH 5570, and 12 credits of DMD 5015 (taken 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 DMD 5900.

M.F.A. Project Requirement: Students must follow the departmental M.F.A. Final Project Process and Procedures guidelines while developing their M.F.A. Final Project. This includes instructions for the formation of an M.F.A. Advisory Committee, submission of a project proposal, and development of a final project. The M.F.A. culminates in a major public exhibition that is supported by a written statement and exhibition documentation. The exhibition features the body of work resulting from the M.F.A. final project and courses taken in the final year of study. Each candidate then participates in an oral defense of the completed body of work and written statement with their advisory committee.

Master of Arts (M.A.) in Digital Media 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.

*The M.A. program is not currently accepting direct applications.

Dramatic Arts (M.A., M.F.A.)

The Department of Dramatic Arts offers a Master of Fine Arts (M.F.A.). The M.F.A. in Dramatic Arts degree is awarded with a concentration in either Acting, Design, Directing, Puppet Arts, or Technical Direction. Additionally, although the Department does not admit students to the University specifically for a Masters of Arts (M.A.), previously matriculated M.F.A. students may apply for an M.A. degree in Dramatic Arts with a concentration in Acting, Puppet Arts, or Production and Design. The M.F.A. and M.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.F.A. in Dramatic Arts Areas of Concentration

Acting. The M.F.A. Concentration 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, appearing as cast in productions at Connecticut Repertory Theatre and completing 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.

Design. The M.F.A. Concentration in Design is an advanced, professional training program with focused tracks in the areas of either Costume Design, Lighting Design, or Scenic Design. The degree requires a minimum of 60 credits and a three year residency. Students are encouraged to take courses across all design disciplines. Additionally, M.F.A. Design students are required to fulfill an Internship Milestone which requires participation in a professional theatre, television, or film studio. The Internship Milestone will be a minimum of three months and a maximum of one year of Curricular Practical Training required for a firm grounding in the profession.

M.F.A. in Design Core Requirements

Costume Design. DRAM 5130. 39 credits from 5132, 5402, 5403, 5405, 5407, 5410 (repeatable), 5411, 5415, 5416, 5417, 5418, 5419, 5420, 5494 (repeatable), 5497. 15 credits of 5492 (repeatable). Three credits of 5496. Internship Milestone.

Lighting Design. Six credits from DRAM 5130, 5132. 18 credits of 5500 (repeatable). 12 credits from 5503, 5514, 5515, 5516. 21 credits from 5592 (repeatable), 5597 (repeatable). Three credits of 5596. Internship Milestone.

Scenic Design. Three credits of DRAM 5130. Three credits of 5312. 12 credits of DRAM 5397 (repeatable). 18 credits from 5300, 5301, 5302, 5316, 5319. 12 credits from 5392 (repeatable), 5396. 12 credits from 5131, 5189, 5320, 5392, 5400-5499, 5500-5599, 5600-5699, 5208. Internship Milestone.

Directing. The M.F.A. Concentration 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.

Puppet Arts. The M.F.A. Concentration in Puppet Arts 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 Puppet Arts Core Requirements: DRAM 5601, 5602, 5603, 5604, 5605, 5607, 5608, 5609, 5610, 5611, 5612, 5613, 5614, 5615, 5616, 5617, 5618, 5619, 5620, 5696.

Technical Direction. The M.F.A. Concentration in Technical Direction is an advanced, professional training in technical production areas associated

with the performing arts. The degree requires a minimum of 60 credits and a three year residency. 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. Students are encouraged to take courses across all design disciplines and are expected to assist in designing the Connecticut Repertory Theatre productions.

Technical Direction Core Requirements: DRAM 5132. 36 credits from DRAM 5200, 5201, 5202, 5204, 5207, 5208, 5209, 5211, 5212, 5213, 5297. 15 credits of DRAM 5292 (repeatable). Three credits of DRAM 5296. Six credits of any 5000 level Dramatic Arts Courses.

M.A. in Dramatic Arts Areas of Concentration

Acting. The M.A. Concentration in Acting requires a minimum of 30 credits, which are composed of a set of acting-studio courses, electives, and casting in Connecticut Repertory Theatre productions. Courses are chosen with the approval of the student's major advisor and based on the student's previous study and experience, projecting intended personal goals and possible employment.

Puppet Arts. The M.A. Concentration in Puppet Arts requires a minimum of 30 credits, which are composed of a set of Puppet Arts courses and electives that are chosen with the approval of the student's major advisor and based on the student's previous study and experience, projecting intended personal goals and possible employment.

Production and Design. The M.A. Concentration in Production and Design requires a minimum of 30 credits, which are composed of a set of production and design courses and electives that are chosen with the approval of the student's major advisor and based on the student's previous study and experience, projecting intended personal goals and possible employment.

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 non-thesis, coursework-based (Plan B) masters that incorporates internship and research experiences, designed for students preparing for careers in biodiversity management, conservation, and environmental education. (The requirements for this degree are described elsewhere in this catalog.) 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, and applied empirical microeconomics (consisting of courses across development, health and labor 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 sequence in a designated Ph.D. field in the Economics Department: labor economics, macroeconomics and money, industrial organization, environmental and natural resource economics, and applied empirical microeconomics (consisting of courses across development, health and labor economics). At least four of the five field courses must be 6000-level. All field courses must be taught (i.e., not independent studies), and other than courses in designated fields in the economics department (listed in this paragraph), only one can be from another department. 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.

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: EDLR 5202, 6050, 6052, 6054, 6055, 6092 (as Critical Reading of Literature and as Methods/Theory), 6312, 6314, 6465, 6466, 6467; GRAD 6950 for data collection and Capstone writing. A total of nine credits of GRAD 6950 is required by the Graduate School. The Ed.D. in Educational Leadership does not have a related area or foreign language requirement.

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: Learning Sciences; 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. The Ph.D. in Educational Psychology does not have a related area or foreign language requirement. (The Neag School of Education also confers Sixth-Year Certificates in Educational Psychology as described elsewhere in the catalog).

Learning Sciences M.A. and Ph.D.

The Learning Sciences (LS) 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 LS 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 LS 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 Learning Sciences (LS) 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 LS 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 Certificate). 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 Certificate 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 an elective course approved by the student's major advisor.

Required Courses: EPSY 5092, 5194, 5601, 5710, 5720, 5740, 5750, 5760, 5780.

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 or 5530, 5605, 5610, 5850, 6601, 6710, 6730, 6770, 6780; EDCI 6000; at least 15 credits of GRAD 6950. Students

will also be required to complete one or more of the following courses: EPSY 5621 or 6611; or EDLR 6052.

Additional Requirements. Students without prior coursework in gifted education will be expected to complete or show competence in the content of EPSY 5710, 5720, 5740, 5760, and/or 5780 as guided by the advisory committee.

Required Examinations. Ph.D. students are required to complete three components for their comprehensive examination: students must pass the M.A. level content examination (unless previously passed as part of an M.A. degree); students must pass a program-required statistics examination; and students must complete a combined written and oral examination for program faculty demonstrating competence in the field and readiness for future professional positions. Students must pass each component of the examinations 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. There is also a completely online option for completing the M.A. degree. 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 5601, 5602, 5605, 5607, 6601, 6621, totaling 18 credits.

Additional Coursework. Students must choose from the following courses or alternative courses that are approved by the student's major advisor, for an additional twelve credits for Plan B or an additional three credits for Plan A: EDCI 6000; EPSY 5510, 5610, 5621, 6623, 6636, 6637, 6651, 6494; EPSY 6601 if EPSY 5601 is taken; PP 5377, 5379.

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 48 credits of required core coursework, three to nine credits of elective coursework and three

to nine credits of independent study, internship or practicum credits (for a total of 60 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 60 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, 6651, and 6655 totaling 48 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.

Additional Requirements. In addition to core coursework, students complete an additional 12 credits for the Ph.D. degree. Students must complete three to nine 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 nine 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 nine credits of independent study or practicum/internship. Students who complete six credits of additional coursework must complete at least six credits of independent study or practicum/internship. Students who complete nine 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 1st 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 general exam: EPSY 5602, 5610, 5613, 5621, 6601, 6611, 6615, 6619, 6621, 6623, 6636, 6637, 6638, 6651, and 6655. The RMME program general examination must be taken within one calendar year of completing all of the required coursework. Further, the general 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 Office of the Registrar.

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 Certificate in School Psychology, and a Doctor of Philosophy (Ph.D.) program.

Master of Arts in School Psychology. The combined Master's/Sixth-Year Certificate program is designed to prepare qualified school psychologists to practice in public schools or related educational settings. The program is accredited by the National Council for Accreditation of Teacher Education (NCATE) and is approved by the National Association of School Psychologists and the Connecticut State Board of Education. 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 Certificate in School Psychology (described separately under Sixth-Year Certificate programs). The combined program requires a minimum of 69 semester hours of graduate coursework (including the practica and internship completed under the Sixth-Year Certificate). The Master's degree is awarded after 30 semester hours of coursework, typically at the end of the

second year of full-time study. The Sixth-Year Certificate 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 5403, 5404, 5420, 5430, 5510, 5602, 5605, 6469, and 6601.

Doctor of Philosophy in School Psychology. The Ph.D. program in school psychology adheres to the scientist-practitioner model of graduate education in health service psychology. The training is designed to prepare students for the practice of health service psychology based on the scientific method, and to promote the commitment to a career of research directed toward the advancement of the science of psychology. Given this mission, the aims are to prepare psychologists who are knowledgeable and competent in: (1) research with relevance to psychology and the specialty area of school psychology, (2) the practice of health service psychology; and (3) the specialty area of school psychology. These aims facilitate preparation of health service psychologists who will practice in schools or other educationally related settings that will meet the professional employment demands for the following: psychologists in psychoeducational research; mental health research specialists in child psychology; psychologists in child treatment agencies, hospitals, and private practice; and professionals in higher education committed to preparing educators and clinicians in psychoeducational services. 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. Although the program is designed to be at least four academic years of full-time study, students typically take four to five years from the baccalaureate degree to complete all doctoral requirements. This involves a minimum of 110 semester hours of coursework, including 15 hours of dissertation research, and a 1500-hour internship that meets the requirements for school psychology.

Dissertation Proposal. 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.

General Examination. Typically, the general exam is completed near the end of their third or beginning of fourth year, and no later than within five years after beginning their doctoral study. The examination is under the jurisdiction of the student's faculty advisory committee, with at least five faculty participating in the examination.

Required Courses: In addition to the courses required for the Master of Arts degree/Sixth-Year Certificate 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 Certificate in Special Education).

Master of Arts in Special Education. 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 pursue a master’s degree for reasons other than certification. The non-certification 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 major advisor.

Integrated Bachelor’s/Master’s (IBM)

IBM Concentration in Special Education (Grades K-12). Required courses: EPSY 5116; EPSY 5142; Three credits of one of the following: EPSY 5113, 5114, or 5115; 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, 5705, 5715, 5720, 5740, 5742, 5750, 5875, 5890, or 5895, or CLCS 5306 or GERM 5305. One credit of EPSY 5221. Required courses total 28 credits.

IBM Elective Required Courses: Three credits of one of the following: EPSY 5113, 5114, 5115, 5119, 5121, 5140, 5145, 5405.

Exam/Culminating Portfolio Requirement. Will be directed by the student’s advisor.

Teacher Certification Program for College Graduates (TCPCG)

Concentration in Special Education (Grades K-12). Required courses: EDCI 5050, 5055, 5060, 5065; EPSY 5092 (three credits), 5113, 5116, 5119, 5121, 5123, 5141, 5142, 5195 (three credits), 5221 (one credit), and 5396 (nine credits). Required courses total 49 credits.

Exam/Culminating Portfolio Requirement. Will be directed by student’s advisor (not filed with The Graduate School by prior arrangement).

Non-Certification Master of Arts Requirements. The Master’s program requires 30 credits in total, which must include the following courses: EPSY 5092 for three to six credits; EPSY 5119, 5121, 5601.

Doctor of Philosophy in Special Education. The Ph.D. 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.

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.

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 Energy Systems. In addition, Ph.D. students can take a track in Computer Engineering, either along with one of the areas of concentration or separately. 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 several 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.

Students complete 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 Electronics, Photonics, and Biophotonics area may include no more than six credits of ECE 6099; students in the Information, Communication, Decision, and Energy Systems area may include no more than three credits of ECE 6099; at least nine 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.

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. Requirements: At least 30 credits of graduate work, with no more than six credits of ECE 6099 and one credit of ECE 6094 for full-time on-campus students. Students must also pass a comprehensive M.S. examination, which is based on the core course work.

M.S. Concentration Requirements

In addition to the general requirements listed above, both Plan A and Plan B students who choose to do an area of concentration must also meet the following requirements:

Electronics, Photonics, and Biophotonics

Required Courses: At least one course from each of the three areas (Area 1 - Electromagnetics/Photonics; Area 2 - Semiconductor/Optoelectronic Devices; Area 3 - Applications). It is not necessary that the remaining courses taken be in the Electronics, Photonics, and Biophotonics area, although they generally tend to be.

Information, Communication, Decision, and Energy Systems

Required Courses: ECE 5101, 6111, 6122, 6151, and 6439. It is not necessary that the remaining courses taken be in the Information, Communication, Decision, and Energy Systems, although generally they tend to be.

Ph.D. in Electrical Engineering

General Requirements: All students in the Ph.D. program must maintain 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.

In addition, students must meet the following minimum research publications requirements:

1. Two conference proceedings, full length papers accepted with first authorship (Journal Papers may be substituted for conference proceedings) by the time of the proposal presentation.
2. Three journal papers with first authorship by the time of the dissertation 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.

Students must also meet a related area requirement, which can be satisfied by six credits of additional graduate work in any single technical area (such as Computer Science, Statistics, Physics, Mathematics, or another Engineering field).

The student's Plan of Study should be completed according to the following requirements and approved before the Ph.D. General Examination. The student's Advisory Committee has the final word on all Plan of Study matters. After the Plan of Study is approved, a Ph.D. Dissertation Prospectus should be submitted at least six months before the defense.

In addition to these general requirements, students who choose to do an area of concentration and/or the Computer Engineering track must satisfy the requirements specific to those specialties outlined below.

Ph.D. in Electrical Engineering: Electronics, Photonics, and Biophotonics Concentration

Requirements: Minimum of 30 credits of content coursework beyond the baccalaureate (or its equivalent) or at least 15 credits of content related coursework beyond the master's degree or other advanced degree in the same or a closely-related field of study; two credits of ECE 6094.

A student will select six (Ph.D.) courses for the written exams in consultation with their advisory committee. At least one course should be chosen from each area: Area 1 - Electromagnetics/Photonics; Area 2 - Semiconductor/Optoelectronic Devices; Area 3 - Applications.

Ph.D. in Electrical Engineering: Information, Communication, Decision, and Energy Systems Concentration

For Student Holders of M.S. Degree

Students must take at least 12 credits of appropriate graduate course work and six credits of related area graduate course work. Of these a maximum of three credits may be ECE 6099. The related area can be satisfied by six credits of graduate work in any single technical area (such as Computer Science, Statistics, Physics, Mathematics, or another Engineering field).

ECE 5101, 6111, and 6122 are introductory basic graduate courses and should not normally count toward the 12 required credits for the Ph.D. In special circumstances, a Systems subgroup Ph.D. student's M.S. background may be considered to have little in common with the Systems subgroup 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.

Requirements: ECE 6094 must be taken for credit at least twice. Attendance at this seminar is required every semester for full-time students. A minimum of 15 credits of GRAD 6950.

The Ph.D. General Examination for Information, Communication, Decision, and Energy Systems students who are not in the Energy Systems subgroup 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 General Examination for students in the Energy Systems subgroup consist of seven exams: three or four of ECE 5101, 6111, 6122, and 6439; three or four appropriate courses in Energy Systems.

For Student Holders of B.S. Degree

Students must take at least 30 credits of appropriate graduate course work and six credits of related area graduate course work. Of these a maximum of three credits may be ECE 6099. The related area can be satisfied by six credits of graduate work in any single technical area (such as Computer Science, Statistics, Physics, Mathematics, or another Engineering field).

Requirements: ECE 6094 must be taken for credit at least two times. Attendance at this seminar is required every semester for full-time students. A minimum of 15 credits of GRAD 6950.

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

The Ph.D. General Examination for Information, Communication, Decision, and Energy Systems students who are not in the Energy Systems subgroup 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 General Examination for students in the Energy Systems subgroup consist of seven exams: three or four of ECE 5101, 6111, 6122, and 6439; three or four appropriate courses in Energy Systems.

Computer Engineering Track Ph.D. Requirements

For Student Holders of M.S. Degree

Requirements: A minimum of five ECE or CSE graduate courses (15 credits). Of these a maximum of three credits may be ECE 6099. The seminar ECE 6094 has to be taken for credit at least twice. 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 and presented before the advisory committee.

For Student Holders of B.S. Degree

Requirements: A minimum of 11 ECE or CSE graduate courses (33 credits). Of these a maximum of three credits may be ECE 6099. The seminar ECE 6094 has to be taken for credit at least twice. 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 and presented before the advisory committee.

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: LAW 7812; NRE 5200 and 5220; and either NRE 5830 (three-credit internship) or NRE 5850 (three-credit practicum).

Elective Courses: Includes 18 credits drawn from one or more of the following specialty areas. Some courses taken within a specialty area may fulfil requirements of a stand-alone graduate certificate program that may be earned concurrent with the MEEM.

Sustainable Environmental Planning and Management: NRE 5200*, 5205, 5210, 5215, 5220*, 5225, 5230, 5585.

Geographic Information Systems: GEOG 5100, 5130, 5230, 5390, 5500, 5505, 5510, 5512, 5515, 5516, 5518, 5520, 5530, 5540, 5600, 5610, 5620, 5810; NRE 4535, 5525, 5535, 5560, 5575, 5585.

Energy and Environmental Law: LAW 7356, 7554, 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.

Engineering (M.Eng.)

The School of Engineering offers a Master of Engineering degree with the following concentrations: Advanced Manufacturing for Energy Systems, Advanced Systems Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Science and Engineering, Data Sciences, Electrical and Computer Engineering, Environmental Engineering, General Engineering, Global Entrepreneurship, Manufacturing 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 Manufacturing for Energy Systems M.Eng.

Master of Engineering in Advanced Manufacturing for Energy Systems (AMES) is an interdisciplinary degree, suitable for all engineering backgrounds. AMES provides students with background in advanced energy systems and manufacturing processes applied to these systems. Courses focus on fundamentals of energy systems and processes, as well as the background required to address the advanced manufacturing needs of the energy industry.

Advanced Manufacturing for Energy Systems Requirements: Students must take a total of 30 credits, including three MENG core courses ENGR 5311, 5312, and 5314; a capstone design course ENGR 5315; AMES 5111; and five technical elective courses for 15 credits from the following list: AMES 5410, 5420, 5441, 5451, 5461; CE 5164, 5166; ECE 5101, 5510, 5512, 5520, 5530, 6102, 6104, 6108, 6161, 6437, 6439; ME 5110, 5120, 5130, 5140, 5160, 5180, 5190, 5311, 5320, 5341, 5430, 5443, 5511, 5522, 5895 (Fuel Cells), 5895 (Fundamentals of Mechanics of Composites), 6130, 6170; MSE 5001, 5320 (Composites Characterization), 5322, 5336, 5787. Other courses may also be substituted if mutually agreed by the student, advisor and program director.

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 development and analysis, systems architecting, model-based system engineering methods, physics-based modeling and analysis, machine learning, data science, decision-making, optimization, verification and validation of engineered systems.

Advanced Systems Engineering Requirements: Required core courses are ENGR 5311, 5312, 5314, and 5315. 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, 5702 or 5095. With prior approval of the major advisor, students may substitute other courses to meet the concentration course requirement. Two electives are required for the remaining required credits, which can be chosen from any engineering discipline. Total requirements are four core engineering courses, and six additional systems engineering courses (30 credits). With prior approval of the major advisor, students in designated programs can meet up to nine credits of these requirements through coursework at other approved institutions.

Biomedical Engineering M.Eng.

The Biomedical Engineering Department offers an online 30 credit Master of Engineering degree with a concentration in Biomedical Engineering. In this concentration students select either the Clinical Engineering track or the Biomechanics Engineering track. Upon completion of the Biomechanics Engineering track, students will be able to lead in the design, development, and manufacturing of biomedical technology, devices, and systems. The Biomechanics track is well suited to those with an undergraduate degree in either Biomedical Engineering or Mechanical Engineering. Upon completion of the Clinical Engineering track, 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, and analyze methods to interconnect medical devices to hospital computer networks to transfer data. Students will be prepared for certification by the American College of Clinical Engineering, will gain exposure in the community, will stay abreast of current technology and best practices, and will be prepared to advance in professional responsibilities and scope of expertise.

Clinical Engineering Track Requirements: Required core courses are ENGR 5311, 5312, 5314, and 5315; required concentration courses are BME 5020, 5030, 5040, 5050, 5070, and 5080.

Biomechanics Engineering Track Requirements: Required core courses are ENGR 5311, 5312, 5314, and 5315; required core concentration courses (choose four courses from the following) are BME 5000, 5100, 5320, 5500, 5600, 5630, 5700, and 6810; elective courses (six credits, choose from core concentration courses or the following electives) CE 5122, 5128, 5163, 5164, and 5166 or ME 5105, 5150, 5155, 5180, and 5190.

Chemical Engineering M.Eng.

The Chemical and Biomolecular Engineering Department offers a 30 credit Master of Engineering with a concentration in Chemical Engineering to provide engineers an educational experience that will advance their knowledge and professional skills on modern chemical engineering topics and will prepare them for their careers in an industrial set up. This offering will help to prepare graduates for advanced positions in a variety of industries including petrochemical processing, materials manufacturing, energy distribution, microelectronics, and biotechnology.

Chemical Engineering Requirements: Required core courses are ENGR 5311, 5312, 5314, and 5315. Core concentration course: CHEG 5001. 15 credits from the following: CHEG 5301, 5315, 5321, 5323, 5330, 5333, 5339, 5341, 5373, 5376.

Civil Engineering M.Eng.

The Master of Engineering in Civil Engineering is a 30 credit master's degree with two tracks: structural engineering and transportation engineering. The field of study of Civil Engineering merges the benefits of technical engineering courses with professional development classes. The target audience includes students who are employed full time in industry as practicing engineers, as well as those interested in expanding their skills before entering industry. As part of a capstone course, all MENG students ultimately complete and defend a final project, typically connected to a work related problem requiring a solution. The structures track focuses on the design of buildings, bridges and other structures and applied mechanics which form the basis of all structural analysis and design. The transportation track focuses on planning, design and operation of transportation systems

Civil Engineering Requirements: Required core courses are ENGR 5311, 5312, 5314, and 5315.

Additional Track Core Courses.

Structural Track (12 credits in total): four of the following: CE 5650, 5122, 5126, 5128, 5150, 5151, 5163, 5164, 5166, 5380, 5382, 5383, 5384, 5610, 5620, 5640.

Transportation Track (nine credits in total): three of the following: CE 5210, 5720, 5730, 5740, and 5750.

Electives.

Structural Track: six credits of any engineering course with M.Eng. advisor approval.

Transportation Track: nine credits from CE 5125, 5128, 5150, 5151, 5163, 5166, 5380, 5640, 5715, 5725, and 5735.

Computer Science and Engineering M.Eng.

The Master of Engineering with a concentration in Computer Science and Engineering fully prepares students for a career in industry. It also enhances the computing expertise of industrial personnel. Students could also pursue a Ph.D. degree after completing this program. This program provides comprehensive knowledge of the theoretical and applied aspects of computer science and engineering. The M.Eng. program assumes that the student already has a background in computing equivalent to a B.A. or B.S. in Computer Science, Computer Science and Engineering, or Computer Engineering.

Computer Science and Engineering Requirements: The degree requires at least 30 credits of graduate level courses. These must include the following four core courses (12 credits in total): ENGR 5311, 5312, 5315, and CSE 5050 or 5500. Students must pass CSE 5050 or 5500 with a grade of B- or higher. Students may take CSE 5500 as an elective if not already taken as a core course. Students are required to take an additional 18 credits of graduate-level coursework in CSE. At most, six of those credits can be from a combination of CSE 5097, 5099, and 5600, with at most three credits from CSE 5097.

Data Sciences M.Eng.

The Computer Science and Engineering Department offers a 30-credit Master of Engineering degree to train engineers on the design of advanced techniques to analyze different kinds of engineering data. The certificate program will build competency in the art of visualizing data and communicating technical ideas through data visualization, as well as competency in data mining, artificial intelligence and machine learning algorithms. This degree is designed to provide functional literacy in critical data sciences and engineering and technical analytics. Students are able to parlay their certificate credits into this degree concentration to receive a full Master of Engineering.

Data Sciences Requirements: Required core courses are ENGR 5311, 5312, 5314 (or CSE 5050 or 5500), 5315. Required concentration courses are CSE 5520, 5713, 5717, 5819. In addition, students must take two elective courses from the following: CSE 5050 (cannot be taken to earn credit after 5500), 5500, 5820, 5850; ECE 6141, 6437; ENGR 5314; ME 5511; ME 5895 when offered as "AI for Design and Manufacturing," or "Computational Nanomechanics;" SE 5402, 5702; CSE 5835 or CSE/SE 5095 when offered as "Machine Learning for Physical Sciences and Systems." Courses may not be used to simultaneously fulfill both core and elective requirements.

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 5315; 18 credits are required for concentration courses and can be chosen from any graduate-level coursework in ECE except ECE 6094 or ECE 6099. Other graduate engineering courses may be taken as concentration electives with prior approval of the advisor.

Environmental Engineering M.Eng.

The Civil and Environmental Engineering department has created a series of courses that will provide the necessary knowledge at an advanced level for thorough understanding of environmental engineering knowledge, techniques and technologies. This will allow students to use appropriate tools and techniques for the planning and design of site investigations and waste containment systems. The depth of knowledge provides an understanding of physical, chemical and biological processes governing containment fate and transport in the environment and application of modern tools to predict behavior. Students will learn to apply fundamental physical, chemical and biological principles to problems in environmental engineering and design comprehensive treatment strategies. In addition, students will acquire the professional discipline for staying abreast of current environmental engineering best practices, follow changes in regulatory and safety standards, and adhere to ethical engineering practice. Students become a member of the environmental engineering community through networking with professional societies, and will be prepared to advance in professional responsibilities and scope of expertise.

Environmental Engineering Requirements: Required core courses: ENGR 5311, 5312, 5314 or ENVE 5320, and 5315. In addition, students are required to take an additional six courses (18 credits) from the following environmental engineering concentration electives: AH 5275; ENVE 5210, 5240, 5252, 5310, 5311, 5330, 5331, 5530, 5810, 5811, 5812, 5821, 5830, and 5850.

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 or CSE 5500 (choose one math), and 5315 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.

Global Entrepreneurship M.Eng.

The Global Entrepreneurship program, a partnership between the University of Connecticut Schools of Engineering and Business and Southern Connecticut State University, is intended to create a nurturing ecosystem for a profession that sees 90 percent of start-ups fold. Students in the program will have a diversified science or engineering background and unique entrepreneurial ideas. This program will enable novice entrepreneurs to learn best practices, receive mentorship from veteran entrepreneurs, and be set up for success.

Global Entrepreneurship Requirements: Core courses are ENGR 5311, 5312; ENGR 5300 when taught as Experiential Technology Entrepreneurship I and II (six credits), and ENGR 5315, a capstone project on market survey, prototyping and/or product development (three credits). In addition, three entrepreneurial idea-related, technical courses are required, which should be 5000 or 6000 level engineering or science courses, and must be approved by the student's major advisor. For students working on

healthcare-related entrepreneurial ideas, one of these three courses must be BME 6086 when taught as Entrepreneurship Life Sciences (three credits). Two electives (three credits each) are required for the remaining required credits, which can be chosen from a list of entrepreneurial/business classes at the University of Connecticut. Total requirements are five core courses and five additional concentration category courses totaling 30 credits.

Manufacturing Engineering M.Eng.

The Mechanical Engineering department offers a fully online 30 credit Master of Engineering with a concentration in Manufacturing Engineering. This curriculum features the synergistic blend of traditional manufacturing techniques and the recent, revolutionary progresses in Industry 4.0 initiative.

Manufacturing Engineering Requirements: Core courses are ENGR 5311, 5312, 5314, and 5315. Students must also take: four of the following six courses MFGE 5110, 5120, 5130, 5140, 5210, and 5220; and two engineering electives (for six credits), which can be chosen from existing School of Engineering online courses with major advisor consent needed.

Materials Science and Engineering M.Eng.

The Materials Science and Engineering department offers a 30 credit Master of Engineering concentration intended for working professionals seeking to advance their knowledge in the discovery, design, selection, characterization, modeling or applications of modern engineering materials, especially metals, alloys, ceramics and composites. Courses in the MSE curriculum place common emphasis on the development of fundamental principles used to establish relationships between structure, processing, properties and performance of materials in engineering applications. Students select plans of study that best match their individual interests or help them achieve their educational and professional goals. **Materials Science and Engineering Requirements:** Required courses: ENGR 5311, 5312, 5314, and 5315. In addition, 18 credits of MSE concentration courses are required. Of these 18 credits, at least 12 credits must come from graduate (5000-level) courses in the MSE field of study. Up to six credits of graduate (5000-level) courses covering topics relevant to materials science or materials engineering may be taken in fields of study other than MSE with major advisor approval.

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 5315 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 (when offered as Mechatronics or Fuel Cells), 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.

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.

Environmental Earth Sciences

The 4+1 M.S. in Environmental Earth Sciences prepares students for a career as an Environmental Professional/Professional Geoscientist. Courses cover the fundamentals of how the earth works from physical, chemical and biologic perspectives and provide program participants with a unique set of skills to address the environmental, water, and climate challenges of the 21st century. Students complete 30 credits. Up to 12 credits of the required graduate coursework at the 5000 level or higher may be used toward both the undergraduate and M.S. plans of study and students are expected to take between nine and 12 credits of required courses while they are undergraduates. However, courses taken at the 3000-4000 level that are counted on a graduate plan of study cannot also be counted toward an undergraduate degree. Only six credits of 3000 or 4000 level coursework may count toward the M.S.

Required Courses: EARTH 4150/5150 and EARTH 6000.

Track Courses: Students must take at least two courses from Group A (Data Acquisition and Analysis), two from Group B (Water, Climate, and the Environment), and select two from either group chosen in consultation with the student's advisor.

Group A: Data Acquisition and Analysis

ERTH 3030, 3710, 5230/4230, 5240/4240, 5430/4430, 5440/4440, 5710/4710, 5810/4810.

Group B: Water, Climate and the Environment

ERTH 3020, 3230, 5130/4130, 5210/4210, 5720/4720, 5735/4735, 5740/4740, 5850/4850.

Electives: Students must complete six additional credits of graduate-level coursework chosen in consultation with the student's 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, 5810, and (5821 or 5540).

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. In addition, all students must register in the seminar course, ENVE 5094, each semester it is offered.

The Qualifying 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.) and is considered the first part of the General Examination. The program administers the examination twice a year, in January and in May. An approved Plan of Study must be filed with the Office of the Registrar before the Qualifying Examination can be taken. The Environmental Engineering Program administers the Qualifying Examination as both a written and an oral examination to test student mastery of core environmental engineering concepts and student ability to integrate concepts across disciplinary areas.

Part two of the General Examination is taken at most one year after the Qualifying examination. The student will prepare a dissertation proposal that outlines the proposed research for the dissertation. The student will defend their proposal in an oral examination to a minimum of five faculty, including all members of their advisory committee.

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.

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, 5323, 5331, 5332, 5333, 5334, 5341, 5343, 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).

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.

Financial Technology (M.S.)

The Master of Science in Financial Technology (M.S. Fintech) is designed to meet the growing demand for professionals who can harness advanced business analytics, technology solutions and financial services skills to address existing business problems. Skills developed in the program will allow students to create new opportunities for small to global enterprises in information-rich environments including Fintech, Insurtech, Medtech, and Regtech. Students must complete 36 credits to fulfill all degree requirements. The program will be available both in-person and online and can be completed on a full-time or part-time basis.

All students must take the following required courses: FNCE 5710, 5711, 5712, 5720; OPIM 5512, 5513, 5603, 5604.

The remaining credits come from electives. The following electives have been approved for meeting degree requirements: FNCE 5313, 5352, 5721, 5722, 5757; OPIM 5272, 5500, 5501, 5509, 5514, 5671, and any 5000-level business course. Additional courses may be used to meet degree requirements with the consent of the program director.

Genetic Counseling (M.S.)

The Institute for Systems Genomics under the authority of The Graduate School at the University of Connecticut offers a Master's Degree in Genetic Counseling. The mission of the Genetic Counseling Professional Science Master's degree program is to prepare the next generation of diverse genetic counseling professionals who can foster innovation, advocacy, and leadership in a technologically dynamic discipline for improved health care outcomes and lifelong learning. The program is accredited by the Accreditation Council for Genetic Counseling, not offered on a part-time basis, and includes required summer components. The program is delivered in a hybrid model wherein the didactic classes are offered in an asynchronous online format and the fieldwork/practical training requires travel to external affiliated hospitals, centers, and clinics. 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. Programmatic student learning outcomes are designed to meet the genetic counseling Professional Based Competencies and the American Board of Genetic Counseling National Certification Examination.

The Genetic Counseling Program is an Affiliate of the National Professional Science Master's (PSM) Association. PSM programs are those which provide interdisciplinary scientific learning, with an emphasis on professional development training and supervised internships, in addition to other standards. Graduates of the Genetic Counseling Professional Science Master's Degree Program will receive a Master's Degree in Genetic Counseling and a National Professional Science Master's Association Certificate of completion.

Program Requirements. Except in special cases, genetic counseling students will complete 43 credits of required didactic coursework and clinical rotations within 24 months. In addition, the student will complete three pre-approved courses; statistics, research methods, and an elective. The successful graduate student under the supervision of a three-faculty member Advisory Committee will complete the requisite number of academic credits inclusive of course work, professional development, clinical rotations, comprehensive examinations, and a capstone project as outlined in an approved plan of study.

Didactic Coursework: ISG 5100, 5102, 5103, 5140, 5141, 5142, 5200, 5203, 5601, 5715, 5730 (three credits), and as pre-approved by Program Director one course in statistics, research methods, and one elective.

Clinical Rotations: ISG 5091 (five credits)

Capstone: ISG 5099 (three credits)

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. The M.A. can be earned under either Plan A or Plan B. Plan A (thesis option) requires a master's thesis, including a thesis defense, while Plan B (non-thesis option) requires a comprehensive final examination. 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 Department of 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 EARTH 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.

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, health equity, 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. In addition, students can earn the M.S. as part of a 4+1 program in Dietetics that prepares students for the Commission on Dietetic Registration's National Registration Examination. 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: A minimum of 30 credits in the following domains.

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

Research: AH 5005, 6306, and one research-based elective with advisor approval; totaling nine credits.

Elective Requirements: Students complete 12 credits from Allied Health Sciences and other schools or colleges across campus chosen in consultation with the student's advisory committee to develop depth in an area of health promotion sciences (e.g., statistical modeling/evidence-analysis, behavioral and environment change interventions, health equity, genetics and diagnostics).

4+1 FastTrack Dietetics B.S./Health Promotion Sciences M.S.

The FastTrack (4+1) B.S. in Dietetics and M.S. in Health Promotion Sciences is a program that is available for highly motivated UConn undergraduate students. The FastTrack allows students accepted into the Undergraduate Coordinated Dietetics Program in Allied Health Sciences at UConn to complete the baccalaureate degree in Dietetics, the Plan B M.S. degree in Health Promotion Sciences, and the hours of supervised practice approved by the Accreditation Council for Education in Nutrition and Dietetics (ACEND), all within five years plus an externship. When all requirements are successfully completed the student may sit for the Commission on Dietetics Registration National Registration Examination.

Students are accepted into the program as early as their 5th semester of undergraduate study based on their academic performance and the completion of prerequisite courses, as well as personal background and/or experiences revealing a commitment to dietetics and health promotion sciences.

Requirements: While fulfilling requirements of their B.S. degree, FastTrack students simultaneously complete a maximum of 12 credits of coursework toward the M.S. (AH 5005, 5351, 6305, 5319 or 6306) which may be applied to both undergraduate and graduate plans of study.

Requirements for the 5th Year of Study: AH 6324, 5335, 5314, 5317 for five credits, and three credits of a graduate level elective (which could include AH 5319 or 6306), and DIET 4315 and 4335.

The following courses are required to meet ACEND requirements and be eligible to take the national dietetics registration exam, NOT for the M.S. degree: Spring semester: DIET 4435, 4455, 4470, and summer a non-degree externship DIET 4991. These courses must be completed with a grade of "C" or higher in the 5th year to meet ACEND accreditation standards. Grades below "C" in any course require a remediation plan approved by a student's major advisor and Program Director.

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, health equity, 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 6181, 6305, 6324, and two health promotion or health equity based electives with advisor approval; totaling 15 credits.

Methodology and Statistics: AH 5005, 6306, and one methodology based elective with advisor approval; totaling nine credits.

Cognate Courses Supportive of Knowledge/Skills and Dissertation 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.

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 higher education and student affairs positions. This full-time, two-year, cohort-based academic program combines traditional instruction with graduate assistantships and practica experiences. Students complete a total of 36 credit hours for

the HESA degree program, which includes a variety of foundational and professional content courses as well as elective graduate courses offered throughout the university.

1st Semester Required Courses: EDLR 5102, 5105, 5122, 5092.

2nd Semester Required Courses: EDLR 5092, 5103, 5117.

3rd Semester Required Courses: EDLR 5092, 5107, 5119.

4th Semester Required Courses: EDLR 5118, 5126, one elective.

Students take three credits of electives and successfully complete and pass their comprehensive examination, which consists of an oral presentation.

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; 15 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 3000-4000 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 24 credits of additional coursework. Students may take up to six credits of 3000-4000 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 highly recommended seminar on teaching history at the university level, HIST 5103, 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; 30 credits of additional coursework or 18 credits of additional coursework if the student enters the doctoral program holding a M.A. from another university. Doctoral students who have received a M.A. from the History Department at the University of Connecticut must complete a minimum of 15 credits of coursework. Students may take up to six credits of graduate courses offered by other departments. In exceptional circumstances, students may petition the Graduate Affairs 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 Affairs Committee for permission for additional independent studies. Up to six credits of 3000-4000 level coursework may also be taken with special permission.

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 reading competency are to be determined in consultation with the student's 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 15th 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 15th 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 15th 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) or GRAD 6960 (Full-Time Doctoral Dissertation Research) in the semesters after completion of regular coursework.

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.

Human Development and Family Sciences (M.A., Ph.D.)

The Department of Human Development and Family Sciences (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 sciences, 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 5010, 5030, 5088, 5099.

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.

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: MENT 5377, 5401, 5639, 5650, 5675, 5676, 5680, 5681, 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, MENT, MKTG, or OPIM).

Human Rights (M.A.)

The Human Rights Institute offers a Master of Arts (M.A.) in Human Rights. The Master's Degree in Human Rights is designed to advance participants' knowledge of human rights as both an academic and professional field, hone students' critical inquiry skills, and ultimately enable students to develop as competitive candidates for professional positions in industry, government, education, and non-profit sectors. The Master's Degree in Human Rights requires the completion of 30 credit hours of graduate coursework, up to 12 of which can be earned during the student's senior year. Up to 12 credits of approved graduate coursework included on the student's undergraduate plan of study can also be used toward both the B.A. and M.A. plans of study. The required 30 credit hours include 12 Common Core credits and a required three-credit practicum (200 hours), at least six Foundational Elective credits, and nine additional elective credits drawn from either the Foundational Elective or Supplementary Elective lists. Other elective options may be approved by the Graduate Education Director after consultation with the Graduate Education Committee.

Common Core Courses: HRTS 5282, 5301, 5351*, 5401, and 5600.

Foundational Electives: EDCI 5847; HRTS 5055, 5095*, 5351*, 5428, 5450, 5460, 5499, and 5899*; HRTS/HIST 5270; HRTS 5390/ECON 5128/ POLS 5390; LAW 7878; SWEL 5385.

Supplementary Electives: ALDS/GERM/CLCS 5324, 5325; ANTH 5325; ENGL 6540; HRTS/ANTH 5327; LAW 7380, 7653, 7695, 7814, 7876, 7883, 7914; POLS 5115, 5322; PUBH 5460/LAW 7592; SOCI/HRTS 5825; SOCI 5515.

**May be repeated for a total of nine credits with a change in subject matter.*

Intersectional Indigeneity, Race, Ethnicity, and Politics (M.A.)

The Master of Arts (M.A.) in Intersectional Indigeneity, Race, Ethnicity, and Politics (IIREP M.A.) seeks to offer interested students, especially UConn undergraduates seeking a 4+1 or 3+1 B.A./M.A. and working public sector professionals seeking an independent M.A., opportunities to learn how critically to explore the relationships among indigeneity, race, ethnicity, and politics in ways that can inform their work and practice.

The IIREP M.A. Plan of Study requires a minimum of 30 credits, including POLS/ANTH/LLAS 5800; POLS 5000, 5605, 5615, 5625, and the one-semester POLS 5620 Master's Project course. In POLS 5000, students must conduct independent research related to IIREP under the supervision of their major advisor. In addition, students must take four elective three-credit 5000/6000-level courses with significant IIREP content. At least two, but no more than three, of the IIREP electives must be taken in POLS. At least one of the four elective courses must have a U.S. focus while at least one must be global in scope.

In each year that they are enrolled, students in the IIREP M.A. must participate in one reading group session in which core IIREP faculty, all enrolled IIREP Graduate Certificate, and all IIREP M.A. students read and discuss one non-course book of relevance to IIREP. IIREP M.A. students must also participate in either one UConn-based graduate student conference or one state, regional, or national conference, sharing research undertaken in their Master's Project course.

Integrative Studies (Ph.D.)

The Graduate School offers Ph.D. students whose dissertation research integrates two or more distinct fields of study the opportunity to earn a Ph.D. in Integrative Studies. The program is intended for students who have already enrolled in a Ph.D. program at the University of Connecticut, and it is aimed at students whose research interests cannot be accommodated within an existing field of study. The Ph.D. in Integrative Studies will allow students to acquire and demonstrate a large degree of disciplinary skills

across fields that may not often intersect. Students considering a Ph.D. in Integrative Studies should be aware, however, that this degree may not allow them to qualify for employment in positions that require advanced degrees in a specific discipline.

Requirements for the Ph.D. in Integrative Studies

Specific course requirements for the individualized Ph.D. in Integrative Studies are determined by the student's Advisory Committee. Students without a master's degree must complete a minimum of 36 credits of graduate-level coursework. Students with a master's degree must complete a minimum of 21 credits of graduate-level coursework. This coursework must include at least six credits of graduate-level coursework from each of two different departments. In addition, all students must complete at least 15 credits of GRAD 6950 or 6960. Students are required to have a minimum GPA of 3.5 to be admitted and to maintain a 3.5 GPA to remain in good standing. The individualized Ph.D. in Integrative Studies does not have a related area or foreign language requirement, unless one is specified by the Advisory Committee.

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.

Latina/o and Latin American Studies (M.A.)

Formerly offered as International Studies

The Master of Arts (M.A.) in Latina/o 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 studies and can focus their work 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 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 must complete all requirements for the M.A. degree and must demonstrate proficiency sufficient to participate in scholarly conversations and research in one language of the region related to their program of study (other than English).

Learning, Leadership and Education Policy (Ph.D.)

The Learning, Leadership, and Education Policy Doctor of Philosophy (Ph.D.) program offers four concentrations: Adult Learning, Higher Education Racial Justice and Decolonization, Leadership and Education Policy, and Sport Management. These four 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, higher education, and sport management. With one concentration primarily focusing on learning theory, one on theories of policy and leadership, one on higher education racial justice and decolonization theories, 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. The Ph.D. in Learning, Leadership and Education Policy does not have a related area or foreign language requirement.

Adult Learning Requirements. The Adult Learning Concentration Plan of Study includes 15 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 general examinations, completion of a successful defense of the dissertation proposal, and successful dissertation defense.

Higher Education Racial Justice and Decolonization Requirements. The Higher Education Racial Justice and Decolonization Concentration Plan of Study includes 15 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 general examinations, completion of a successful defense of the dissertation proposal, and successful dissertation defense.

Leadership and Education 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, completion of a successful defense of the dissertation proposal, and successful dissertation defense.

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 examinations, completion of a successful defense of the dissertation proposal, and successful dissertation defense.

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 Ph.D. in Linguistics does not have a related area or foreign language requirement. 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 30 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 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-level 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 a minimum of 30 credits 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: The Ph.D. in Materials Science requires a minimum of 30 credits of content coursework beyond the baccalaureate or at least 15 credits of content coursework beyond the master's degree. 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 that 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, 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 both Plan A and Plan B, students are required to complete all of the MSE graduate core courses (MSE 5301, 5309, and 5334).

For Plan A, the student must successfully complete at least 21 credits of coursework (including the core courses), 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 30 credits of coursework (including the core courses), 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 30 credits must also include three credits of independent study in MSE culminating in a final project, and the student must pass a comprehensive oral examination conducted by the advisory committee based on this project.

Ph.D. Requirements

Students are required to complete all of the MSE graduate core courses (MSE 5301, 5309, and 5334), and 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. The Ph.D. in Materials Science and Engineering does not have a related area or foreign language requirement.

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.

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. Students do not need to satisfy the Graduate School foreign language/related area requirement.

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. The Ph.D. in Mechanical Engineering does not have a related area or foreign language requirement. 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.

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 5884; section 02 of MCB 5884; 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.

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.

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 6000, 6500; and any additional course work as approved by the candidate's advisory committee as part of the Plan of Study.

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 (this program is not currently accepting new students), Family Nurse Practitioner, Neonatal Nurse Practitioner, Nurse Leader, and Nurse Educator. The Commission on Collegiate Nursing Education accredits the program. The plan of study includes online 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. For students applying to the Adult Gerontology Acute Care Nurse Practitioner, Family Nurse Practitioner, Adult Gerontology Primary Care Nurse Practitioner, and Nurse Educator concentrations, documentation of a minimum of 2,080 hours of clinical experience as a Registered Nurse (RN) providing direct patient care must be provided in the admission application. For those candidates in the Neonatal Practitioner Program, a minimum of two years full-time, RN-level practice experience in a level three neonatal intensive care unit is required prior to enrolling in NURS 5369. All Master's programs are delivered fully online.

No student may take more than 12 credits in 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. The M.S. program does not require a final comprehensive exam.

Nurse Practitioner Required Core Courses: NURS 5012, 5020, 5030, 5035, 5060, 5870.

Adult Gerontology Acute Care Nurse Practitioner Track: NURS 5500, 5550, 5559, 5560, 5562, 5569, 5570, 5579, 5590.

Adult Gerontology Primary Care Nurse Practitioner Track (This program is not currently accepting new students): NURS 5062, 5400, 5405, 5409, 5410, 5419, 5420, 5429, 5470.

Family Nurse Practitioner Track: NURS 5062, 5400, 5405, 5409, 5410, 5420, 5430, 5439, 5449, 5470.

Neonatal Nurse Practitioner Track: NURS 5350, 5362, 5365, 5369, 5370, 5375, 5379, 5385, 5389.

Nurse Educator and Nurse Leader Required Core Courses: NURS 5012, 5020, 5030, 5035, 5235, 5249, 5870.

Nurse Educator: NURS 5060, 5062, 5470 or 5590, 5700, 5710, 5720.

Nurse Leader: NURS 5230, 5240, 5245, 5865.

Credit requirements for each M.S. track:

- Adult Gerontology Acute Care Nurse Practitioner: 45 credits
- Adult Gerontology Primary Care Nurse Practitioner: 45 credits (This program is not currently accepting new students)
- Family Nurse Practitioner: 48 credits
- Neonatal Nurse Practitioner: 44 credits
- Nurse Educator: 39 credits
- Nurse Leader: 33 credits

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. The D.N.P. prepares nurses 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 includes four Nurse Practitioner concentrations (Adult Gerontology Acute Care Nurse Practitioner, Adult Gerontology Primary Care Nurse Practitioner (this program is not currently accepting new students), Family Nurse Practitioner, and Neonatal Acute Care Nurse Practitioner) as well as a concentration for a Nurse Leader. These concentrations require students to complete the coursework for the associated concentration for the M.S. in Nursing and lead 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. 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 GRAD 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. Healthcare Innovation Online Graduate Certificate: NURS 5111, 5112, 5113, 5114.

Requirements for Clinical Practice

In addition to academic qualifications, UConn nursing students must possess the ability to consistently demonstrate a proficiency in five core areas for nursing students: motor, sensory, communication, behavior and critical thinking skills. These areas reflect the reasonable expectations of a nursing student performing the common functions of a registered nurse or an advanced practice nurse.

The ability to consistently demonstrate these personal and professional competencies are essential from admittance to graduation. Students must be capable of performing the skills of a nursing student.

Therefore, each nursing student must have the ability to learn and perform the following competencies and skills:

Motor: The student must possess sufficient motor capabilities to execute the movements and skills required to provide safe and effective nursing interventions. These include, but are not limited to:

- a. Coordination, speed and agility to assist and safely guard (protect), with safe and proper body mechanics, patients who are ambulating, transferring, or performing other activities.
- b. Ability to adjust and position equipment and patients, which involves bending or stooping freely to floor level and reaching above the head.
- c. Ability to move throughout the classroom or clinical site, and sit and stand for long periods of time to carry out patient care activities.
- d. Ability to perform patient care duties for up to 12 hours at a time, day or night.
- e. Ability to move or position patients and equipment, which involves lifting, carrying, pulling up to 30 pounds.
- f. Ability to guide, resist, and assist patients, or to provide emergency care, which involves standing, kneeling, sitting, or walking.
- g. Ability and dexterity to manipulate the devices used in giving nursing care.
- h. Ability to administer CPR without assistance.

Sensory: The student must be able to obtain information in classroom, laboratory, or clinical settings through observation, auscultation, palpation and other measures, including but not limited to:

- a. Visual ability (corrected as necessary) to recognize and interpret facial expressions and body language, identify normal and abnormal patterns of movement, to read or set parameters on various equipment, to discriminate color changes, and to interpret and assess the environment.
- b. Auditory ability (corrected as necessary) to recognize and respond to soft voices, auditory timers, equipment alarms, call bells, and to effectively use devices for measurement of blood pressure, breath sounds, etc.
- c. Tactile ability to palpate a pulse and to detect changes or abnormalities of surface texture, skin temperature, body contour, muscle tone, and joint movement.
- d. Sufficient position, movement and balance sensations to assist and protect patients who are ambulating, transferring, or performing other activities.

Communication: The student must be able to communicate effectively with peers, faculty, patients and their families, and other health care providers. This includes, but is not limited to:

- a. Ability to read at a competency level that allows one to safely carry out the essential functions of an assignment (examples; handwritten chart data, printed policy, and procedure manuals).
- b. Ability to effectively interpret and process information.
- c. Ability to effectively communicate (verbally and in writing) with patients and their families, health care professionals, and others within the community.
- d. Ability to access information and to communicate and document effectively via computer.
- e. Ability to recognize, interpret, and respond to nonverbal behavior of self and others.

Behavior: The student must be capable of exercising good judgment, developing empathic and therapeutic relationships with patients and others, and tolerating close and direct physical contact with a diverse population. This will include people of all ages, races, socioeconomic and ethnic backgrounds, as well as individuals with weight disorders, physical disfigurement and medical or mental health problems. This also includes, but is not limited to:

- a. Ability to work with multiple patients, families, and colleagues at the same time.
- b. Ability to work with classmates, instructors, health care providers, patients, families and others under stressful conditions, including but not limited to providing care to medically or emotionally unstable individuals, situations requiring rapid adaptations, the provision of CPR, or other emergency interventions.
- c. Ability to foster and maintain cooperative and collegial relationships with classmates, instructors, other health care providers, patients and their families.

Critical Thinking: The student must possess sufficient abilities in the areas of calculation, critical problem solving, reasoning, and judgment to be able to comprehend and process information within a reasonable time frame as

determined by the faculty and the profession. The student must be able to prioritize, organize and attend to tasks and responsibilities efficiently. This includes, but is not limited to:

- Ability to collect, interpret and analyze written, verbal, and observed data about patients.
- Ability to prioritize multiple tasks, integrate information, and make decisions.
- Ability to apply knowledge of the principles, indications, and contraindications for nursing interventions.
- Ability to act safely and ethically in the college clinical lab and in clinical placements within the community.

If a nursing applicant or student is unable to meet one or more of these areas due to a long-term or short-term disability, they may request consideration for an accommodation through the Center for Students with Disabilities. Prompt notice is essential for full consideration. The requirements for clinical practice apply for all programs which include a clinical component.

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, quantitative and mixed 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 (minimum of one published paper, one external podium or poster presentation), submission of one peer-reviewed grant application, 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.

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

The Department of Nutritional Sciences offers Master of Science and Doctor of Philosophy degrees. University of Connecticut undergraduates can pursue a fast track pathway (4 + 1 program) that allows them to earn both a Bachelor of Science degree and a Master of Science degree in 5 years. 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. Students interested in pursuing a master's degree in personalized nutrition as their primary graduate program are encouraged to apply to the Department's stand-alone Master of Science in Personalized Nutrition (MSPN) online program.

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 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; three credits of statistics, and a minimum of six additional credits of graduate courses plus 15 credits of research for the dissertation (GRAD 6950). *Students may also satisfy the Responsible Conduct in Research (RCR) requirement by completing a two-day RCR workshop offered by the Office of the Vice President for Research. However, this workshop is not offered for academic credit; therefore, the

one credit from GRAD 5910 must be replaced with an additional graduate credit from another course.

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. 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. The Ph.D. in Nutritional Sciences does not have a related area or foreign language requirement.

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 Master of Science. The Master's degree is offered as a research-oriented Plan A (thesis) program, and as a course-based Plan B program. The Plan B program includes an accelerated (4+1) program for UConn undergraduates majoring in Marine Sciences. 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.

The curriculum for the Plan B master's degree includes coursework in biological, chemical, physical and geological oceanography and an examination in the final year. Potential employers include non-governmental organizations, state and federal agencies, secondary and postsecondary educational institutions, and environmental consulting firms. This program may also provide preparation for more advanced graduate studies, although students interested in research are encouraged to apply for the Plan A (thesis-based) M.S.

Master of Science Plan A

Requires 21 credits of advanced coursework, including at least 12 credits of graduate MARN coursework, nine GRAD 5950 credits, and completion of a research project, the results of which are reported in a thesis.

Master of Science Plan B

Requires 30 credits of advanced coursework, including at least 12 credits of graduate MARN coursework, and a final examination. No research project is required.

Although students decide on their coursework in consultation with their major advisor based on their academic background and research goals, the coursework is typically built around a two-tiered structure: four courses MARN 5010, 5030, 5050, and 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.

Accelerated (4+1) Master of Science Plan B

Students pursuing a UConn undergraduate Bachelor of Science degree in Marine Sciences can apply to use up to 12 credits of graduate coursework taken as an undergraduate towards both their B.S. and their M.S. For students in the accelerated program, the Master of Science Plan B degree can be earned in a single year after finishing the B.S.

Required Core Courses: All students in the accelerated program must take four core courses: MARN 5010, 5030, 5050, and 5065. To finish the combined program in five years, MARN 5010 and 5050 should be taken in Year Four as an undergraduate student and MARN 5030 and 5065 should be taken in Year Five as a graduate student.

Students are also required to take at least six credits from the following list: MARN 5012, 5015, 5017, 5032, 5812, 5505, 5018, 5066, 5052, 5210. Six of these credits should be taken in Year Four (as an undergraduate) and can be used for both the B.S. and the M.S. degrees. The remainder of the required 30 credits must be selected from MARN courses, based on the interest of the student and approval of the student's major advisor. However, no more than six credits can be at the 3000-4000 level, no more than three credits of MARN 5893 and three credits of MARN 5899 are allowed, and no more than three credits of MARN 4893, 4895, 4896W, or 4898 are allowed.

Final Examination: The students in the accelerated program will be responsible for the material in the four core courses and must pass a final examination based on these courses.

Doctor of Philosophy

Requires 30 course credits plus 15 credits of GRAD 6950 or 6960 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 or 6960 in addition to six related area credits.

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: PATH 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. The Ph.D. in Pathobiology does not have a related area or foreign language requirement. 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.

Personalized Nutrition (M.S.)

The Department of Nutritional Sciences offers an online Master of Science in Personalized Nutrition (MSPN). The MSPN program is a professional degree that uniquely combines courses in nutrigenomics, clinical nutrition, and nutritional biochemistry to provide a foundation of knowledge and skills for Personalized Nutrition professionals.

Master of Science Requirements

At least 30 credits are required and must come from MSPN core courses.

Required Core Courses: NUSC 5200, 5280, 5300, 5314, 5410, 5600, 5700, 6311, 6313, and 6410.

Pharmaceutical Sciences (M.S., Ph.D.)

The School of Pharmacy's Program in Pharmaceutical Sciences offers graduate degrees in three areas of concentration: Medicinal and Natural Products Chemistry, Pharmacology/Toxicology, and Pharmaceutics.

Medicinal and Natural Products Chemistry

The Division of Medicinal and Natural Products Chemistry in the Department of Pharmaceutical Sciences offers a Ph.D. in Medicinal and Natural Products Chemistry. The Division also offers a Master of Science (M.S.) degree in Medicinal and Natural Products 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 and Natural Products 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 and Natural Products 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 and Natural Products Chemistry and Pharmaceutical Sciences Departmental seminars. Each student will present a seminar once per year.

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 and Natural Products 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 5403², 5297, 5454, 5471, 5472; PNB 5302¹.

¹ 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.

² 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; PATH 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

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 also enable students to earn an M.A. without being enrolled in the Ph.D. program, but such cases are not common and we generally admit only those students intending to obtain the Ph.D. Most students enter the Ph.D. program with at least a B.A. in

Philosophy (or related field) and obtain the M.A. in the first two years of the Ph.D. program, proceeding from that point to the Ph.D. Students who are admitted to the Ph.D. program 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 in the process of obtaining the Doctor of Philosophy

Requires a minimum of 30 credits of Philosophy coursework.

Required Courses: PHIL 5301 and 5307.

Masters Exam: Students must submit two essays in any area(s) of Philosophy demonstrating mastery in one or more subjects in the field.

Research Proposal: Students must demonstrate ability to formulate an original and defensible line of philosophical research.

Doctor of Philosophy

For students who enter the Ph.D. program with a B.A., the Ph.D. requires an additional 15 credits beyond the 30 credits required for M.A. degree above, for a total of 45 credits of content coursework, plus 15 credits of GRAD 6950 (Dissertation Research). The Ph.D. in Philosophy does not have a related area or foreign language requirement.

For students who enter the Ph.D. program with an M.A. in Philosophy from a different institution, the Ph.D. requires a minimum of 30 credits of content coursework, plus 15 credits of GRAD 6950 (Dissertation Research).

Required Courses:

1. PHIL 5301
2. PHIL 5307
3. One course in Ethics and Social Political Philosophy: either PHIL 5302, or PHIL 5315, or PHIL 5350, or PHIL 5380. Substitutions can be made and require the permission of the Director of Graduate Studies.
4. One course in Metaphysics and Epistemology: either PHIL 5312, or PHIL 5330, or PHIL 5331, or PHIL 5340, or PHIL 5342. Substitutions can be made and require the permission of the Director of Graduate Studies.
5. One course in History of Philosophy: either PHIL 5320, or PHIL 5327. Substitutions can be made and require the permission of the Director of Graduate Studies.

General Examination: Students must submit three essays, one of which demonstrates mastery in Ethics, Social and Political Philosophy; one of which demonstrates mastery in Metaphysics and Epistemology; and one of which demonstrates mastery in 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.

Master of Arts in Philosophy without admission to the Ph.D. program

Requires a minimum of 30 credits of Philosophy coursework.

Required Courses: PHIL 5301 and 5307.

Masters Exam: Students must submit two essays in any area(s) of Philosophy demonstrating mastery in one or more subjects in the field.

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.

Required Health-Related Community Service: All Doctor of Physical Therapy Students must complete 30 hours of Health-Related Community Service. Types of service that qualify and final approval of hours must be obtained from the Program Director.

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. Oral examination, short (~30 minutes) oral presentation on a research topic chosen in consultation between the student and their advisory committee, followed by an oral exam probing the student's physics knowledge underlying their presentation. Students must satisfy the core coursework requirement before taking the Ph.D. General Examination (i.e. obtain a grade of B or better in four courses from the core course list). The general examination committee consists of the student's three-person advisory committee, plus two other faculty members from a different research field.

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 5396 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 5395 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 5350. No more than two of PNB 5700, 5270, or 5350 can be used to fulfill the core course requirements.

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. The M.S. degree requires the student to take an M.S. final examination. The Ph.D. in Plant Science does not have a related area or foreign language requirement.

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

Up to 12 credits of approved graduate coursework included on the student's undergraduate plan of study can also be used toward both the B.A. and M.A. Plans of Study.

Required Courses: All 5th year students must take POLS 5000 (for three credits), 5605, 5615, 5620, and 5625. 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). Finally, students must take three other courses of their choosing that are approved by their major advisor.

Research Presentation: All 5th Year POLS Master's students must present the research conducted in POLS 5000: Independent Study in Political Science before a three-person faculty committee before the end of their final semester.

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 Ph.D. in Political Science does not have a related area or foreign language requirement. 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.

Politics and Popular Culture (M.A.)

The Master of Arts (M.A.) in Politics and Popular Culture (PPC) requires 30 credits. All MPPC students take the following:

- Required Core Course (three credits): POLS 5700.
- Required Course (at least one): POLS 5100, 5200, 5300, or 5400.
- Required Core POLS Sequence (six credits): POLS 5600, 5605, or 5615.
- Required Master's Project I POLS 5620, and Master's Project II POLS 5621, totaling six credits.

MPPC students will then take the remaining credits from POLS classes with substantial PPC content. Preapproved classes are POLS 5710, 5720, 5105, 5100* (Special Topics, repeatable with different content) POLS 3426, 3822. Students are encouraged to take at least one class with PPC content in a department other than POLS, with M.A. coordinator advice and consent. (* or other core DHMS equivalent).

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 5351, 5352, 5380, 5381, 5382, 5384, 6001; and at least 15 additional credits of Doctoral Dissertation Research GRAD 6950. 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. The Polymer Science Program does not have a foreign language or related area requirement.

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. The Ph.D. in Psychological Sciences does not have a related area or foreign language requirement.

Ph.D. Plan of Study Psychological Sciences Department Requirements. Predissertation 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 six 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 their 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; MENT 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 School 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. Up to 12 credits of approved graduate coursework included on the student’s undergraduate plan of study can also be used toward the master’s degree as part of the Fast-Track.

Master of Public Administration Requirements

The M.P.A. degree is comprised of 42 credits. These credits include 24 credits of core coursework (eight courses), 12 credits of electives (four courses), six credits of internship and a zero credit professional development course.

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 three 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 core M.P.A. courses (24 credits), elective credits (12 credits), and a capstone portfolio (zero credit). The M.P.A. program’s internship requirement and the required zero credit professional development course are waived for M.P.A. Fellows.

Master of Public Administration Required Core Courses: PP 5340, 5345, 5361, 5364, 5365, 5370, 5375, and 5376 to total 24 credits.

Focus Area. Students complete 12 credits of electives in areas that support their career goals. Nine credits of electives are used toward a focus area. M.P.A. focus areas include executive leadership (Fellows track only); law and public policy; nonprofit management; public financial management; public policy; state and local government management; social policy; public policy, diversity, and inclusion; survey research; and urban planning. 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.

Public Health (M.P.H., Ph.D.)

The Department of Public Health Sciences 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 for students anticipating careers working with local Governmental or non-Governmental agencies in delivering essential public health services. 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.). The Ph.D. degree focuses on the Social and Behavioral Determinants of Health and rigorously prepares individuals for careers in academic and research institutes, federal agencies and private sector business and industry.

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 30 required credits for foundational (i.e., required) courses in Public Health. In consultation with program advisors, students will complete three PUBH-elective courses to reflect a topical area of student interest, and either an Integrative Learning Experience consisting of either nine credits of GRAD 5950 or two additional electives along with three credits of PUBH 5499. Students must maintain a cumulative grade point average (GPA) of 3.0. Grades below “B” in any foundational course or “C+” in any elective represent academic deficiencies that require a remediation plan approved by a student’s major advisor and Program Director.

Required courses: PUBH 5403, 5404, 5405, 5406, 5408, 5409, 5411, 5431 and two semesters of 5407.

Substantive Areas of Focus. Elective courses should be selected in consultation with program advisors and reflect a substantive focus on Epidemiology and Biostatistics, Health Administration and Policy, Environmental and Occupational Health or Health Promotion/Disease Prevention.

Master of Public Health FastTrack (M.P.H.)

A FastTrack (4+1) B.A./B.S. and M.P.H. option is available for highly motivated UConn undergraduate students. The FastTrack allows students to complete their baccalaureate degrees in any UConn-approved discipline and all M.P.H. degree requirements within five years. The FastTrack program is a 14 course, 42-credit opportunity that utilizes distance learning/video conferencing technologies (e.g., iTV) to synchronously link undergraduates with graduate courses offered on the Farmington campus.

Students are accepted into the program as early as their 5th semester of undergraduate study on the basis of their academic performance (a minimum GPA of 3.25), personal background and/or experiences revealing a commitment to the health communities.

While fulfilling requirements of their B.A./B.S. degree, FastTrack students simultaneously complete a maximum of 12 credits of coursework toward the M.P.H. (PUBH 5408, 5409, 5411 and 5431) that may be applicable to both undergraduate and graduate plans of study. During a 5th year of study, students will complete remaining foundational course requirements (PUBH 5403, 5404, 5405, 5406 and two semesters of 5407). In addition, through consultation with program advisors, students will elect to complete either, one PUBH-elective course and GRAD 5950, or three PUBH-electives and PUBH 5499. Students must maintain a cumulative grade point average (GPA) of 3.0. Grades below “B” in any foundational course or “C+” in any elective represent academic deficiencies that require a remediation plan approved by a student’s major advisor and Program Director.

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 credits in coursework and 15 credits of Doctoral Dissertation Research. The Ph.D. in Public Health does not have a related area or foreign language

requirement. 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.

Foundational Knowledge: PUBH 5406 or 5460; 5434 or an advanced statistical elective; 5436 or an advanced epidemiology elective; 5453; and 6496. A student must maintain a cumulative grade point average (GPA) of 3.0 with no grade below a “B-.”

Population Research Methods: With permission of a student’s advisory committee.

Biostatistics Electives. With permission of a student’s advisory committee.

Epidemiology Electives. With permission of a student’s advisory committee.

Doctoral Dissertation Research: 15 credits of GRAD 6950 or 6960.

Public Policy (M.P.P.)

The School 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 students with the analytic and quantitative skills necessary to design, analyze, and evaluate the success of policies. The M.P.P. program is centered on the analysis of real-world problems, combining theory, quantitative methods, and practical applications in policy analysis and program evaluation. 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. Up to 12 credits of approved graduate coursework included on the student’s undergraduate plan of study can also be used toward the master’s degree as part of the Fast-Track.

Master of Public Policy Requirements

The M.P.P. degree is comprised of 42 credits. These credits include 24 credits of core coursework (eight courses), 12 credits of electives (four courses), six credits of internship and a zero credit professional development course. The curriculum is outlined below.

Required Core Courses: PP 5314, 5331, 5340, 5342, 5345, 5347, 5375, and 5376 to total 24 credits.

Focus Area. Students complete 12 credits of electives in areas that support their career goals. Nine credits of electives are used toward a focus area. M.P.P. focus areas include law and public policy; leadership and public management; nonprofit management; public financial management; public policy, diversity, and inclusion; social policy; state and local government management; survey research; and urban planning. 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.

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. These 30 credits must come from required MSQE core courses.

Required Core Courses: ECON 5201, 5202, 5301, 5311, 5312, 5317, 5318, 5321 as well as two graduate courses in Economics from the following list: ECON 5314, 5315, 5322, 5323, 5326.

Optional Courses: ECON 5501 and 5502.

Regenerative Engineering (M.S.)

The Master of Science (M.S.) in Regenerative Engineering program is intended to train a new transdisciplinary workforce for Regenerative Engineering. Regenerative Engineering is a new field defined as the convergence of advanced materials science, stem cell science, physics, developmental biology and clinical translation for the regeneration of complex tissues and organ systems. The master program is administrated by the Department of Chemical and Biomolecular Engineering and the Department of Materials Science and Engineering at the University of Connecticut.

Requirements: The M.S. in Regenerative Engineering requires a minimum of 30 credits. The credits include: 21 credits of advanced course work and successful completion of a thesis research (Plan A). Thesis research is equivalent to nine credit hours. The thesis must be an original and significant contribution to the field of regenerative engineering and related science and must be defended orally according to Graduate School requirements.

Core Courses (15 credits): CHEG 5013, 5352, 5373; MSE 5001, 5700.

Elective Courses: A total of six elective credits are required. Students will choose from a list of approved courses including, but not limited to: BME 5000, 6086; CHEG 5358, 5395; CSE 5800, 5810, 5815; MSE 5322, 5336. Students may request permission from the Advisory Committee and the Program Director to enroll in an elective that is not on the list of approved courses.

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 5342, or SPTP 5318; 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, 5390, 5391; 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.

Joint Program with Yale Divinity School

In conjunction with the Yale University Divinity School in New Haven, Connecticut, the School of Social Work offers a program in which students may earn the MSW degree from UConn and the M.Div. degree from Yale in four years instead of the five years required when these programs are taken separately. Yale University will accept up to nine elective credits earned in UConn's MSW program. Students in the joint program will have their MSW elective credits waived (six credits for CO and POPR students and nine credits for IGFP students), thereby reducing the required MSW credits from 60 to 54 for CORG and POPR students and from 60 to 51 for IGFP students. Students should consult with the School of Social Work Joint Degree liaison to discuss the approval of their Yale elective coursework. Students must be enrolled concurrently in both schools and earn both degrees simultaneously to benefit from this arrangement.

Doctor of Philosophy Requirements

The course of study for the Doctor of Philosophy (Ph.D.) in Social Work consists of 56 graduate credits. Eleven required courses totaling 35 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, 6415, 6420, 6425, 6435, 6445, 6460.

Sociology (M.A., Ph.D.)

The Department of Sociology offers both a Master's of Arts (M.A.) degree and a Doctor of Philosophy (Ph.D.) degree. The M.A. degree can be earned under either Plan A (thesis) or Plan B (non-thesis) options. Students in the Ph.D. program enroll concurrently in the Plan A M.A. program, which is available only to these students. The Plan B M.A. is available only to UConn students who are admitted to the Department's accelerated (4+1) program (and to Ph.D. students who do not wish to continue in the Ph.D. program).

Accelerated (4+1) Master of Arts in Sociology

The accelerated (4+1) M.A. in Sociology is designed for UConn undergraduates who want to develop the training and skills needed to pursue careers focused on social justice. The program allows students to specialize in one of four available tracks: (1) Gender, Sexuality, and Social Justice; (2) Racism Studies and Inequality; (3) Social Change and Social Justice; and

(4) Research Methods. The program requires a total of 30 graduate credits. Up to 12 credits of the required graduate coursework may be used toward both the B.A. and M.A. Plans of Study.

Requirements: To earn the M.A. degree through the 4+1 program, a student must meet the following requirements.

Required Core Graduate Courses: 12 credits of core courses: SOCI 5201, 5203, 5231, and 5895.

Track Courses: nine credits (three courses) from one of the following tracks, chosen in consultation with the student's major advisor.

Gender, Sexuality, and Social Justice: SOCI 5601, 5602, 5604, 5613, 5614, 5651.

Racism Studies and Inequality: SOCI 5501, 5505, 5515, 5421, 5613.

Social Change and Social Justice: SOCI 5801, 5806, 5809, 5821, 5825, 5829.

Research Methods: SOCI 5210, 6203, 6205, 6231.

Electives: nine additional credits of graduate-level courses in Sociology, at least three of which must be from one of the tracks above other than the student's chosen track. In the student's +1 year, they may, with the consent of their advisor, substitute an approved course in another department for three credits of elective sociology coursework.

Master of Arts in Sociology (with concurrent enrollment in Ph.D. program)

Most Ph.D. 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.

In addition to Graduate School requirements, when completed in conjunction with enrollment in the Ph.D. program, 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, which constitutes a final examination for Plan B students. 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 total of 33 credits beyond the Master's in Sociology degree. These credits include: six credits of required Sociology courses (SOCI 6203, 6231), 12 credits of Sociology electives, and 15 credits of GRAD 6950 (Doctoral Dissertation Research). Students may also take up to six credits of seminars outside of the department, but these may not be used in place of the Sociology elective credits.

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 and Hearing Sciences requires satisfactory completion of a minimum of 47 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 of 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, 5349, and 5378.

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. In addition to the above courses, all 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 5123, SLHS 5376, SLHS 5380).

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.

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: Three hours of Research Methods taking EPSY 5601. (Additional research courses recommended only for students selecting the thesis option. These credit hours could count as electives). EDCI 6000, EPSY 5605, 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.

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 5095. 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 their Advisory Committee. Knowledge of a sequence of core courses is required for all Ph.D. students. These courses are STAT 5095, 5505, 5515, 5585, 5605, 5685, 5725, 5735, 6315, 6325, 6515, and 6894, for a total of 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.

Surgical Neurophysiology (M.S.)

The Master of Science in Surgical Neurophysiology is a one-year professional master's program designed to provide students with the knowledge and clinical training required to become a board-certified Surgical Neurophysiologist. Courses in neuroanatomy, neurophysiology, neural signal acquisition, and the application of neurophysiological measurements in the surgical environment are covered in a year-long program of study, beginning in the summer. A total of 32 credits are required. In addition, students complete a clinical practicum. After completion of the program and participation in 100 surgical cases (during or after their clinical practicum), students will be eligible to participate in the national exam for Certification in Neurophysiologic Intraoperative Monitoring (CNIM Certification) conducted by the American Board of Registration of Electroencephalographic and Evoked Potential Technologists (ABRET).

Program Requirements:

Required Courses (20-26 credits): PNB 5101, 5102, 5103, 5106, three to nine credits of PNB 5104, and four credits of PNB 5105.

Electives (6-12 credits): Students select the remaining required credits from the following: PNB 3251, 3275, 4400, or any PNB Graduate level courses; NURS 3100, 3110, 3120; PSYC 5228; and SLHS 5322, 5375; no more than six credits from courses at the 3000-4000 level. A minimum of 26 credits needs to be from PNB courses including the Required Courses.

Students must also complete a clinical practicum that includes a minimum of 250 clinical contact hours in mentored surgical cases.

Survey Research and Data Analysis (M.A.)

The School of Public Policy offers an online Master of Arts (M.A.) in Survey Research and Data Analysis. The program prepares survey research professionals to gather data about attitudes, opinions, behaviors, or demographics and analyze that information to answer complex questions about society. The program delivers high-quality instruction in both traditional and cutting-edge methodologies, qualitative and quantitative data collection, and data analysis techniques through a robust online delivery platform.

Master of Arts Requirements

Students take a total of 30 credits.

Required Core Courses (24 Credits): PP 5332, 5376, 5377, 5379, 5383, 5341 or 5385, 5386, and 5389*.

Electives (Six Credits): Students without two years of relevant work experience must complete three-credits of PP 5390 Supervised Internship in lieu of three-credits of electives.

Systems Genomics (Ph.D.)

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.

* Prior to submitting an application to this program, interested applicants should contact the Systems Genomics program administrator.

Certificate Programs

The University of Connecticut offers several types of certificate programs: post-master's (or sixth year) certificates, graduate certificates, and post-baccalaureate certificates. Post-master's/sixth year certificates that require 30 or more credits for completion follow rules and requirements that are similar to those of an equivalent master's degree (if one exists). Graduate certificate programs consist entirely of graduate courses (those numbered 5000 or above). Post-baccalaureate certificate programs consist primarily of undergraduate courses (those numbered 1000-4999). 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.

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.

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.

Adult Learning

A program leading to the Sixth-Year Certificate in Adult Learning provides an opportunity for advanced students who have the master's degree to increase their professional competence through further study under the guidance of a faculty member.

The Adult Learning 6th year program in the Department of Educational Leadership prepares individuals to:

1. Identify issues that impact adult learning across a variety of contexts;
2. Critically examine important questions in the field using rigorous research methodologies and methods;
3. Construct theoretical models based on sound empirical research to guide practice and policy;
4. Lead organizations in assessing and meeting learning needs of individual adults, organizations, and communities;
5. Design supportive learning environments and systems;
6. Facilitate learning activities to optimize adult learning;
7. Apply lenses of social justice and organizational change to work in and with complex organizations.

Students must earn at least thirty credits in a planned program of professional education beyond the Master's Degree, and complete a summary project or a comprehensive exam.

Required Core Courses (15 credits): EDLR 5201, 5204, 6313, 6467, 6050.

Adult Learning Courses (nine credits minimum):

Tract One courses focus on the Individual Learner. Examples of courses in this tract include: COMM 5101; EDLR 5202; HDFS 5215; PSYC 5251; PSYC 5567.

Tract Two courses focus on Designing Learning Environments. Examples of courses in this tract include: COMM 5650; EPSY 5220, 5520, 5530; PP 5319.

Research Courses (six credits minimum): EDCI 6000, 6005; EDLR 6052; EPSY 5605, 5607; Other research courses as appropriate, such as EPSY 5610, 5613, 5621.

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.

Requirements

Students must successfully complete four of the following six courses for a total of 12 credits: ACCT 5327, 5532, 5554, 5555, 5557, and 5583.

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 18 credits.

Required Courses (12 credits): MKTG 5115*, 5251, and 5665; OPIM 5603**.

Flexible Marketing Electives (six credits): Two additional 5000-level MKTG electives.

Not all courses are available every semester on every campus.

* Prerequisite for all other 5000-level Marketing courses.

**Prerequisite for MKTG 5251 and several Flexible Marketing Electives. Students enrolled prior to the 2018 catalog year may substitute OPIM 5103.

Advanced Business Certificate in Financial Technology

This certificate is designed to meet the unique needs of experienced professionals, managers, and executives who have significant work experience in their field and want to enhance their skills in Financial Technology (Fintech) and its application in financial services and related industries. Students must complete 12 credits.

Required Courses: FNCE 5710, 5711, 5720, and OPIM 5513.

Required Electives: One elective from the following list: FNCE 5353, 5712, 5721, OPIM 5603 or 5604. Other courses may be substituted as an elective with the approval of the program director.

The certificate program will be available both in-person and online and can be completed on a full-time or part-time basis.

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.

This certificate is offered by the School of Business and is not open to students in the M.S. in Business Analytics and Project Management (MSBAPM) program.

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: Four electives from the following list: MENT 5138, 5223, 5250, 5377, 5401, 5615, 5639, 5650, 5674, 5676, 5678, 5680, or 5681.

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: MENT 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.

Advanced Business Certificate in Supply Chain Analytics

This program is designed for people who want to systematically use data to drive evidenced-based decision making in supply chain management settings. Students must complete 12 credits.

Required Courses: OPIM 5110, 5111, 5112, 5113.

Advanced Materials Characterization

The Institute of Materials Science (IMS) offers a 12-credit fully online certificate program to train engineers in the characterization of advanced materials that are crucial to creativity, innovation and product analysis and quality control in the globally competitive economy. The certificate program builds competency in the analysis of advanced materials systems related to understanding compositions and physical properties of materials, data analysis, sample preparation methods, and basic operation of spectroscopy, chromatography, and microscopy equipment. The program aims to teach scientists and engineers analysis, decision-making, optimization, verification and validation of materials systems.

Required Courses: IMS 5301, 5302, 5303, and 5304.

Advanced Systems Engineering

The UTC Institute for Advanced Systems Engineering offers a 12-credit fully online 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 teaches requirements development and analysis, systems architecting, model-based system engineering methods, physics-based modeling and analysis, machine learning, data science, 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, 5702, 5095, or 5502. The required fourth course can be selected from any of the three categories.

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 interdiscipline 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.

Applied Behavior Analysis

The Graduate Certificate in Behavior Analysis is a seven-course (21-credit) graduate certificate program offered entirely online. It is designed to fulfill the coursework requirements for Board Certification as a Behavior Analyst (BCBA). As such, it targets graduate students, working professionals, and others who are interested in obtaining their BCBA, gaining an in-depth knowledge of Applied Behavior Analysis, or engaging in continuing education. Students must maintain a GPA of 3.0 or higher in each required course.

Required Courses: EPSY 5405, 5461, 5462, 5463, 5464, 5465, and 5469.

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

Arts Leadership and Cultural Management

Formerly offered as Arts Administration

The School of Fine Arts offers an online graduate certificate in Arts Leadership and Cultural Management. The certificate comprises four required courses totaling 12 credits that 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 skills for practical application through active online learning. 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.

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.

Bridge Engineering

The Civil and Environmental Engineering Department offers a 12-credit certificate program to train engineers on the design and construction of bridge structures. The certificate program builds competency in steel and prestressed concrete bridge design, accelerated bridge construction and design related to extreme events.

Required Courses: Students are required to take the following core courses: CE 5380, 5383, 5384 and 5640.

Clinical and Translational Research

The certificate program is administered by the Connecticut Convergence Institute for Translation in Regenerative Engineering at the University of Connecticut. It is designed to provide an introduction to clinical and translational research. The program provides 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.

Clinical Genetics and Genomics

The graduate certificate program in Clinical Genetics and Genomics is a four-course, twelve-credit, online graduate certificate program. The program provides foundational knowledge in clinical genetics and genomics and is designed for individuals who possess a bachelor's degree and who wish to enter the exciting and growing profession of clinical genetics. It is also designed for individuals already practicing in the health care field but are interested in gaining an academic foundation to improve work performance and/or enhance their professional advancement. Admission to the graduate program in Clinical Genetics and Genomics requires completion of an undergraduate degree in science, or related health and science fields. Completion of this certificate program does not qualify a student for eligibility to sit for the American Board of Genetic Counseling certification examination.

Required Courses: ISG 5100, 5101, 5102, and 5103. Course substitutions may be made with prior approval from Program Director.

Cognitive Science

UConn Ph.D. students seeking a deeper, more interdisciplinary understanding of how people perceive, act, know, and think are invited to apply. Working professionals and others looking to change careers or augment their current career trajectory through the interdisciplinary study of Cognitive Science can complete the certificate program on a full-time or part-time basis. Students must complete 12 credits.

Required Course: COGS 5001.

Required Electives: Students design an individualized plan of study in consultation with their advisory committee and the Certificate advisor (Program Director). The three electives need to be from at least two academic departments/divisions outside their home department. Please refer to the program website for the most up-to-date course listings.

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.

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.

Required Electives: Two of the following courses: ME 5443, 5522; MSE 5135, 5364, 5380, 5787.

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, 5821, or 5830.

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 5175, 5750; LAW 7554, 7553.

Required Courses for current JD and JD-degree holders: BLAW 5750; 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; MENT 5138, 5223*, OPIM 5165, 5771*, or 5604**.

* By permission of instructor.

** By permission of instructor; formal background in statistics required.

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 Sciences (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.

Curriculum and Instruction

Sixth-Year Certificate in Bilingual and Multicultural Education, Literacy Specialist Program, 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 Certificates in Bilingual and Multicultural Education, Literacy Specialist Program, 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 Certificates in Reading and Language Arts Consultant, Remedial Reading and Language Teacher, which are described below.) The Sixth-Year Certificate 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 Certificate 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 Degree Audit in the Office of the Registrar.

Sixth-Year Certificate 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 Certificate 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 Certificate 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 Certificate General Requirements. For all Sixth-Year Certificates 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.

Dementia Care

The 12-credit Dementia Care Graduate Certificate addresses an existing and growing market need to prepare nurses and other healthcare professionals on essential theories, concepts and skills for healthcare coordination of patients and caregivers affected by Alzheimer's Disease and Related Dementias (ADRDs). The Dementia Care Certificate offered through the UConn School of Nursing is designed to educate healthcare professionals and administrators for the common goal of improving care outcomes and quality of life for patients with ADRDs and their caregivers with a focus on culturally responsive and patient and family centered care principles. The knowledge learned through this program is valuable to nurses and healthcare professionals who are involved in the management of direct patient care and care coordination of patients with ADRDs. This certificate is offered entirely online. Required courses: NURS 5105, 5106, 5107.

Diagnostic Genetic Sciences

The Diagnostic Genetic Sciences (DGS) certificate program is a two-year educational and clinical post-baccalaureate training program in genetic and genomic 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. Genetic and genomic testing information is used for screening, diagnosing, prognosticating and monitoring many human diseases. Diagnostic genetic scientists are credentialed professionals critical to the research, application and translation of genetics and genomics to personalized or precision medicine. Students in the DGS professional certificate program complete requirements for diagnostic molecular sciences which is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) (5600 N. River Rd, Suite 70, Rosemont IL 60018-5119; 773-714-8880). The DGS curriculum includes on-campus didactic and laboratory coursework and an off-site clinical and research internship at an affiliated laboratory. Graduates are eligible to sit for the American Society for Clinical Pathology (ASCP) Board of Certification examination in molecular biology (MB) immediately upon graduation.

Required courses: AH 2001, 3021, 3121, 4241; DGS 3100, 4234, 4235, 4236; MLSC 4500; four related cognates 2000 level or above as approved by their DGS advisor; totaling 33 credits.

Required Practicum Courses: DGS 4402, 4503, 4604, 4850; and one of the following DGS 4510, 4512, 4513, 4515.

Clinical Experiences. All students are required to complete a four-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.

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 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, among other digital scholarship formats, a genuinely multimodal or born-digital 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 three courses (nine credits) listed inside or outside of their home department with a focus on digital or media studies. DHMS maintains a list of courses across campus that may satisfy the nine 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.

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.

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.

Educating Bilingual Learners

The graduate certificate in Educating Bilingual Learners is a 12-credit program intended for educators who are interested in better supporting English learners in schools, such as classroom teachers, literacy specialists, special education teachers, school psychologists, administrators, and others. The program consists of four online courses.

Required Courses: EDCI 5742, 5750, 5875, and 5890.

Educational Administration 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.

Year One, Summer Required Courses: two credits of EDLR 5401; two credits of EDLR 5402.

Year One, Fall Required Courses: two credits of EDLR 5403; two credits of EDLR 5404; one credit of EDLR 5092.

Year One, Spring Required Courses: two credits of EDLR 5405; two credits of EDLR 5406; one credit of EDLR 5092.

Year Two, Summer Required Course: two credits of EDLR 5407; three credits of EDLR 5408; one credit of EDLR 5092.

Year Two, Fall Required Courses: two credits of EDLR 5409; two credits of EDLR 5410; one credit of EDLR 5092.

Year Two, Spring Required Courses: two credits of EDLR 5411; two credits of EDLR 5412; one credit of EDLR 5092.

Educational Psychology

The Sixth Year Certificate in Educational Psychology can be earned in any one of the following areas of concentration: (1) Learning Sciences (LS), (2) Counseling, (3) Educational Technology, (4) Giftedness, Creativity and Talent Development, (5) School Psychology, and (6) Special Education.

Learning Sciences (LS)

The Learning Sciences 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 Certificate Requirements. The Sixth-Year Certificate requirements in LS conform to the Graduate School requirements. Specific programmatic requirements and course sequences are described below. The Certificate in LS requires a minimum of 30 credits comprised of core (see below) and elective courses. The Certificate 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 LS Certificate. 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

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 Certificate.

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.

Educational Technology

The Department of Educational Psychology offers a Sixth-Year Certificate program in Educational Technology, featuring the Two Summers Sixth-Year Certificate 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 Certificate in Educational Technology requires 30 credits. For the "Two Summers Sixth-Year Certificate" 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

The Sixth-Year Certificate 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 Certificate 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 Certificate 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 Certificate 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, 5740, 5750, 5760, 5780.

Required Examinations. Students must complete required computer-based examinations near the completion of their required coursework. Passing scores on the examinations are required for certificate completion.

School Psychology

The Sixth-Year Certificate 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 Certificate 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 Certificate in School Psychology, students must satisfactorily complete the required courses listed below.

Required Courses: EPSY 5194 (when offered as Academic Intervention), 5405, 5406, 5408, 5425, 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

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.

Emerging Women's Leadership

The Emerging Women's Leadership graduate certificate program is a 12-credit online program designed to educate and prepare emerging leaders concerned with gender inequality and gender barriers in the workplace to serve as catalysts for change in their field of choice through the translation of leadership theory to practice. Taking an intersectional approach, students of all identities who seek gender equality in society are immersed in a practicum leadership experience for the duration of the program, providing an organizational context for the application of theory and the development of a capstone project that addresses a problem of practice. The program consists of four online courses.

Required Courses:

- **Semester 1:** EDLR 6464; EDLR 6092 (three credits)
- **Semester 2:** EDLR 5343; EDLR 6092 (three credits)

Engineering Data Sciences

The Computer Science and Engineering Department offers a 12-credit certificate program to train engineers on the design of advanced techniques to analyze different kinds of engineering data. The certificate program will build competency in the art of visualizing data and communicating technical ideas through data visualization, as well as competency in data mining, artificial intelligence and machine learning algorithms.

Required Courses: CSE 5520, 5713, 5717, and 5819.

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).

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/ 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.

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.

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.

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.

Genomic Data Analysis

The Certificate in Genomic Data Analysis is designed to develop skills in the analysis of high throughput genomic data. Genomics is a rapidly growing field with applications in government, industrial and academic settings, and this certificate trains students in practical skills useful to extract and communicate insight from large genomic datasets. Students must complete 12 credits over two semesters.

Required Courses:

- **First Semester:** ISG 5301 and 5311;
- **Second Semester:** ISG 5302 and 5312.

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.

Required Courses: EPSY 5710, 5740, 5760, and 5780.

Global Health

The Global Health certificate is a 12-credit graduate certificate in interdisciplinary global health offered through the Institute for Collaboration on Health, Intervention, and Policy (InCHIP) in partnership with Global Affairs.

The certificate recognizes the interdisciplinary nature of global health and offers students concentrated exposure to foundational concepts, opportunities to dive deeper into an area of interest, and exploration of interdisciplinary methodological concepts. The certificate program also recognizes that global health encompasses not only international contexts, but also local health, and more importantly how 'local' and 'global' health influence each other. No prior experience with, or knowledge of global health is required, but prior coursework in statistics, epidemiology and/or research methods may be helpful.

Requirements: Students are required to take CHIP 5100, plus three additional elective courses (three credits each) chosen from the courses listed below, as approved by the Global Health Graduate Certificate Committee. Students are allowed, but not required, to take one elective course in their home department and one course listed in the Foundational Courses category. The certificate requires completing all four courses while maintaining a GPA of 3.0 or higher in each required course.

Electives courses:

Foundational Courses (limited to one from this category): AH 5501; ANTH 5377; PUBH 5462

Culture and Health: HDFS 5020

Infectious Diseases: PSYC 5711

Health as a Human Right: ANTH 5305; PUBH 5201, 5451, 5460; SWEL 5385

Sustainability: ARE 5305; AH 5505

Healthcare and Systems: PUBH 5463

Methods and Data Analytics: AH 6310; ARE 5311, 5203, 5353; GEOG 5500, 5530; HDFS 5004

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.

Health Care Innovation

The 12-credit Health Care Innovation Certificate Program addresses an existing and growing market need to educate nurses, health care professionals, and others interested in healthcare on essential theories, concepts and applications within the domain of innovation for the health care industry. The Health Care Innovation Certificate offered through the UConn School of Nursing is designed to educate individuals in nursing and beyond for the common goal of introducing positive and necessary change to the health care industry. The knowledge learned through this program is valuable to nurses, all health care professional role groups and those who are in need of this knowledge in the context of health care to understand existing opportunities and refine existing ideas. This certificate is offered entirely online.

Required Courses: NURS 5111, 5112, 5113, and 5114.

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.

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. (NCHCEC).

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.

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.

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.

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: EDCI 5847; HRTS 5301; LAW 7878, 7883; or SWEL 5385.

Preapproved Electives:

College of Liberal Arts and Sciences: ANTH 5315; ANTH 5377/PUBH 5497; ANTH 5325, 5326; ANTH/HRTS 5327; ANTH 5395*; BLAW/BADM/HRTS 5254; CLCS 5317*; CLCS/GERM/ALDS 5324, 5325; ECON 5473, 6473; ECON 5128/HRTS 5390; ENGL 6540; GERM 6480*; GERM 5314*/CLCS 5317; GERM 5345/CLCS 5317*; GERM 6460/HEJS 5397/CLCS 5317*; GEOG 5810*; HIST 5195*, 5525, 5622; HRTS 5055, 5095, 5270, 5282, 5351, 5401, 5428, 5450, 5460, 5499, 5600, 5899*; LLAS 5105*; PHIL 5315; POLS 5010*, 5115, 5322; SOCI/HRTS 5825, 6825; SOCI 5515, 5614, 5801, 5806, 5895*; SPAN 6402*, 6405*, 6416; WGSS 5395*, 5398*.

School of Education: EDCI 5094*.

School of Social Work: SWEL 5317, 5318, 5345, 5348, 5350, 5360, 5375.

Law School: LAW 7358*, 7357, 7360, 7380, 7386, 7529, 7558, 7609 (only open to law students; only four credit classroom component counts towards certificate), LAW 7653, 7655, 7672, 7679, 7695, 7722, 7759, 7814, 7815, 7831, 7838, 7872, 7876, 7914, 7927*; LAW 7592/PUBH 5497; LAW 7942/PUBH 5463; PUBH 5497/ANTH 5377.

Intersectional Indigeneity, Race, Ethnicity, and Politics

The Intersectional Indigeneity, Race, Ethnicity, and Politics (IIREP) Graduate Certificate offers mentorship to advanced students seeking a community of transdisciplinary peer and faculty interlocutors who share interests in nurturing ideas and networks necessary to support the advancement of inquiry devoted to exploring the relationship among domestic and international politics, social identities, and persistent inequalities.

Requirements: Students are required to complete four pre-approved three-credit courses with significant IIREP 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 indigeneity, 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 IIREP 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 IIREP faculty and enrolled students read and discuss one non-course book of relevance to IIREP. IIREP Graduate Certificate students must also participate in one UConn-based graduate student conference, sharing research undertaken in one of their IIREP courses.

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 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.

Leadership and Public Management

The School 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.

Licensed Professional Counselor

The Licensed Professional Counselor Certificate is designed for those students who have already completed a master's degree in School Counseling, School Psychology, or a related mental health field at a regionally accredited institution. Applicants must have taken, or, be enrolled in a master's program that requires coursework in the following content areas; human growth and development, social and cultural foundations, counseling theories, counseling techniques, group counseling, career counseling, appraisal procedures, research and evaluation, and a practicum of at least 100 hours. At the conclusion of the coursework and clinical internships individuals can apply for the LPC-A certification from the Connecticut Department of Public Health. Students must complete 18 credits.

Required Courses: EPSY 5323, 5625; EPSY 5322 (must be repeated for a total of six credits); EPSY 5324, 5626.

Life Story Practice and Research

The School of Nursing offers a 12 credit online certificate program in Life Story Practice and Research. The purpose of this online certificate program is to prepare graduate students and professionals with the knowledge and skills needed to conduct life story interventions and/or programs with individuals, families, and groups. Students will examine different life story methods including written and oral narratives, reminiscence, life review, autobiographical memory, and guided autobiography. Two fieldwork courses provide opportunities for students to apply life story methods under the mentorship of experts in the field.

Required Courses: NURS 5190, 5191, 5192, 5193, and 5194.

Literacy and Deaf Education

The Neag School of Education Program in Literacy and Deaf Education is a 12-credit graduate certificate designed for pre- and in-service teachers. Students are required to take EDCI 5165 and 5170, and select two additional courses from the set of courses listed below.

EDCI 5140, 5705, 5742, 5750, 5890; PSYC 5441; SLHS 5123.

Literacy Leadership

The Neag School of Education program in Literacy Leadership is a 12-credit graduate certificate designed for educators interested in obtaining the 097 Reading and Language Arts Consultant certification. Students are required to take EDCI 5150 or 5155; EDCI 5160; and six credits of EDCI 5092 (practicum).

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 EPSY 5113, 5114, 5115 or 5123.

Literary Translation

The Graduate Certificate in Literary Translation offers training in a wide range of applied and cross-cultural theoretical approaches to translation, while providing a professional toolset for creating publishable translations and research articles. The certificate is designed to provide both hands-on, practical experience, and a strong theoretical foundation in what has become one of the most globally relevant fields of the twenty-first century. The certificate can be earned by students enrolled in a University of Connecticut Graduate Degree Program, or as a stand-alone certificate for those who already possess an undergraduate degree. Total course requirement is 12 credits.

Required courses: TRST 5010, 5011, and 5020.

Elective course: one course at the 5000/6000-level from one of the foreign language literatures offered by the department of Literatures, Cultures, and Languages, or one of the Creative Writing or Literature courses offered by the English Department. Students may choose an elective course from another graduate department at UConn with the approval of the Director of the Program in Literary Translation.

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.

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).

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.

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.

Certificate in Jazz: Two semesters of MUSI 5305 or 5324, and two semesters of MUSI 5300.

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 School 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. Certificate students choose two electives in addition to the two required courses.

Required Courses: PP 5323 and 5328.

Elective Courses: Certificate students work with their advisors to choose the most appropriate electives from PP 5319, 5324, 5329, 5336, and 5366.

Nurse Educator

The Nurse Educator Graduate Certificate is a nine-course (27-credit) graduate certificate program offered entirely online. It is designed for Masters-prepared nurses who wish to pursue a nurse educator role in institutions of higher education, staff development, or other education industries. The certificate program provides knowledge and skills on evidence-based and cutting-edge strategies for teaching and learning in nursing. The certificate will prepare you for eligibility to apply for national certification through the National League for Nursing as a Certified Nurse Educator (CNE). A minimum of 2,080 hours of clinical experience as a Registered Nurse (RN) providing direct patient care is required prior to application.

Required Courses: NURS 5060, 5062, 5235, 5249, 5470 or 5590, 5700, 5710, 5720, 5870.

One or more of the following course requirements may be waived with approval at the time of admission based on a student having taken equivalent courses: NURS 5060, 5062, 5470 or 5590, and 5870.

Nurse Leader

The Nurse Leader Graduate Certificate is a seven-course (21-credit) graduate certificate program offered entirely online. It is designed for Masters-prepared nurses who wish to pursue administrative leadership within healthcare organizations and provides real-world skills in staff development, labor relations, healthcare financing, quality improvement and human resource management. The certificate program can be used to fulfill some of the eligibility requirements to apply for the ANCC Nurse Executive Certification examination or the American Organization for Nurse Leaders as a Certified Nurse Manager and Leader (CNML) or Certified in Executive Nursing Practice (CENL).

Required Courses: NURS 5230, 5235, 5240, 5245, 5249, 5865, 5870.

One or more of the following course requirements may be waived with approval at the time of admission based on a student having taken equivalent courses: NURS 5235, 5865, and 5870.

Obesity Prevention and Weight Management

The Interdisciplinary Obesity Prevention and Weight Management certificate is a 12-credit graduate certificate offered through the Institute for Collaboration on Health, Intervention, and Policy (InCHIP). The certificate recognizes the interdisciplinary nature of obesity and offers students concentrated exposure to foundational concepts and opportunities to dive deeper into broad topic areas such as the nutritional, exercise, and behavioral sciences as well as policy. The certificate program recognizes that there are multiple drivers of the obesity epidemic and challenges students to explore solutions for obesity at various levels and settings (e.g., from prevention to treatment, from childhood to adult, from individual to policy). Students who earn this graduate certificate will be better equipped to engage in interdisciplinary research and clinical care on obesity-related issues and collaborate across knowledge silos with the goal of understanding, preventing, and treating obesity. No prior experience with, or knowledge of obesity prevention or weight management is required, but prior coursework in research methods, nutrition, kinesiology, or behavioral sciences may be helpful.

Requirements: Students are required to take CHIP 5000, plus three additional elective courses (three credits each), one from each of the three areas below, as approved by the Interdisciplinary Certificate in Obesity Prevention and Weight Management Committee. Students are allowed, but not required, to take one elective course in their home department. The certificate requires completing all four courses while maintaining a GPA of 3.0 or higher in each required course.

Electives courses (minimum of one course from each category):

Nutritional Sciences: NUSC 5398, 6315, 6317; HDFS 5095.

Physical Activity/Exercise Science: KINS 5507, 5508, 5595.

Behavioral Science and Policy: AH 6305, 6324; ARE 5205; COMM 5770; HDFS 5095, 5340; PSYC 5120, 6750; PUBH 5477.

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.

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.

Oceanographic Science and Technology

This graduate certificate program is designed to train engineers and environmental scientists in ocean science and technology. The certificate program focuses on the environmental factors, design challenges, and corresponding analysis with direct applications to the growing fields of marine technology, ocean engineering, and marine renewable energy. Students complete a 12-credit set of online courses in Marine Sciences, Mechanical Engineering, and Electrical and Computer Engineering. These courses build competency in ocean fluid dynamics, oceanographic data analysis, underwater acoustics, and underwater sensing systems analysis and design.

Required Courses: MARN 5068, 5200; ECE 5151; and ME 5215.

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.

Post-Graduate APRN Certificate Program

(Formerly Offered as Nursing Practice)

The School of Nursing offers Post-Graduate APRN Certificates in the following concentrations: Adult Gerontology Acute Care Nurse Practitioner, Adult Gerontology Primary Care Nurse Practitioner (this program is not currently accepting new students), Family Nurse Practitioner, and Neonatal Nurse Practitioner. These certificates are appropriate for registered nurses (RNs) with a bachelor's degree in nursing and a master's degree who wish to pursue an APRN concentration. Each concentration consists of

population-focused practicum courses and their associated theory courses. Faculty track directors may require additional coursework on an individual basis. Applicants must possess a minimum grade point average of 3.0 (B) from their graduate program in nursing.

Post-Graduate APRN Certificate: Adult Gerontology Acute Care Nurse Practitioner (AGACNP)

Post-Graduate APRN Certificate: AGACNP 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.

Required Courses: NURS 5060, 5500, 5550, 5559, 5560, 5562, 5569, 5570, 5579, and 5590.

Post-Graduate APRN Certificate: Adult Gerontology Primary Care Nurse Practitioner (AGPCNP) (This program is not currently accepting new students)

Post-Graduate APRN Certificate: AGPCNP 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 concentration are prepared to apply for eligibility to take the AGPCNP certification examination prepared by an approved national organization.

Required Courses: NURS 5060, 5062, 5400, 5405, 5409, 5410, 5419, 5420, 5429, and 5470.

Post-Graduate APRN Certificate: Family Nurse Practitioner (FNP)

Post-Graduate APRN Certificate: FNP graduates are prepared as advance practice nurses to assess, diagnose, monitor, treat and coordinate care of individuals across the lifespan with common acute and chronic conditions within the context of family and community. The focus of the specialty is on the delivery of primary care to the individual across the lifespan within the context of the family and community 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 concentration are prepared to apply for eligibility to take the FNP certification examination prepared by an approved national organization.

Required Courses: NURS 5060, 5062, 5400, 5405, 5409, 5410, 5420, 5430, 5439, 5449, and 5470.

Post-Graduate APRN Certificate: 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 four post-graduate APRN certificate program concentrations are the core courses (if not completed in original graduate degree program) and the related concentration specific courses.

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, 5145, 5199, and either 5140 or 5146.

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, 5520, 5530, and 5540.

Power Grid Modernization

The Eversource Center offers a 12-credit certificate program to train engineers in the industry of utility power grid modernization. The certificate program aims to augment skills and competence in areas of high priority as perceived by the utility stakeholders. The students will be trained in four main areas:

1. Fundamentals and practice of control techniques, design, and operation of microgrids.
2. End-to-end processing, analytics, and interpretation of modern power grid data.
3. Smart grid architectures, applications, requirements, technical challenges, and enhancements in communication systems.
4. Operation, control, and management of energy resources in smart distribution grids.

Required Courses: ECE 5550, 5552 and 5554; and ENVE 5331.

Precision Nutrition

The Department of Nutritional Sciences offers a 12-credit online graduate certificate program in Precision Nutrition. The program is designed for individuals working in healthcare, private practice, and industry and provides advanced knowledge in human nutrition, nutritional genetics and genomics, and metabolism. The certificate's integrated curriculum establishes the foundation essential to developing individualized dietary recommendations for the promotion of health and prevention of chronic disease.

Requirements: NUSC 5200, 5300, 5700, and one 5000-level or 6000-level NUSC elective.

Pre-Medical and Health Professions Post-Baccalaureate Program

The University of Connecticut Pre-Medical and Health Professions Post-Baccalaureate 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 3.50 or better is required for Program A; 3.25 or better for Program B. 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 specific 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 Enrichment Programs 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.

Process Engineering

The Chemical and Biomolecular Engineering Department offers a 12-credit fully online certificate program in Process Engineering. Process engineering is the merger of fundamental engineering science and knowledge along with empirical information to develop and optimize processes. Process Engineering is primarily grounded in the discipline of Chemical Engineering and its core areas, including thermodynamics, transport phenomenon, and kinetics. The fundamental knowledge for Process Engineering is encoded in mathematical models, whereas the empirical information is represented by data science/machine learning models. To be an effective process engineer, one must develop a familiarity with both of these areas, as well as the ability to integrate them. Over the course of this program, the student will be introduced to these concepts within the context of real-world case studies.

Required Courses: CHEG 5001, 5330, 5333, and 5339.

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.

Public Financial Management

The Graduate Certificate in Public Financial Management (PFM), offered through the School 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.

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.

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; HDF5 5095 when taught as Longitudinal Methods, Meta Analysis, or other topic approved by the Program Director; MENT 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.

Remote Sensing and Geospatial Data Analytics

This is an online program offered by the Department of Natural Resources and the Environment. The Remote Sensing and Geospatial Data Analytics (RSGDA) program is designed for college graduates and graduate students looking to develop remote sensing knowledge and skills, and working professionals looking to enhance their skills or prepare for a graduate degree program. It takes about 12 to 18 months to complete.

Requirements: The program requires 12 credits total. Six credits come from two required courses; NRE 5525 and 5535. Six additional credits are earned by selecting two of the following four courses; NRE 5215, 5545, 5560, or 5585.

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.

Social Determinants of Health and Disparities

The Certificate in Social Determinants of Health and Disparities (CSDH&D) is intended to train 21st century health care and public health practitioners 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. UConn Medical and Dental students enrolled in the CSDH&D complete the equivalent of four graduate level courses 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). UConn Medical and Dental students pursuing the dual M.P.H./M.D. or M.P.H./D.M.D will receive the equivalent of a 12-credit waiver as part of the dual program requirements for having completed the CSDH&D.

Other candidates for the CSDH&D will complete four courses offered in traditional semester format. Subject matter of the certificate 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.

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 5094, 5140, 5146, and either 5119 or 5145.

Survey Research

The Online Graduate Certificate in Survey Research, which is offered by the School 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 and Data Analysis provided the student makes the decision to apply to the Master's degree program prior to having the certificate awarded. Graduate certificate students and their advisors decide the most appropriate course of study.

Required Courses: PP 5379 and nine additional credits of the following: PP 5322, 5332, 5376, 5377, 5382, 5383, 5384, 5341 or 5385*, 5386, 5387, 5388, 5389, or 5397.

*Recommended course for students who do not have professional survey research experience.

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.

The certificate courses may be applied to or completed concurrent with the online Master of Energy and Environmental Management degree.

Required Courses: NRE 5200 and 5220; two electives from the following list: NRE 5205, 5210, 5215, 5225, 5230, or 5585.

**Systems Genomics:
Clinical Communication and Counseling**

The Systems Genomics: Clinical Communication and Counseling Graduate Certificate is a 12-credit asynchronous online program consisting of four courses designed to provide foundational concepts of counseling and health communication theories. Concepts of counseling will be applied in varied formats toward creating effective provider-patient or advocate-consumer communication. Skill development will focus on supporting health care discussions and conversations requiring translation of genetic and genomic information for the benefit of the person and society in the era of precision medicine. This program is designed for individuals tracking for or already practicing in the health care field who are interested in gaining an academic foundation to improve work performance and/or for professional advancement. Admission to the graduate program in Systems Genomics: Clinical Communication and Counseling requires completion of an undergraduate degree in a related communication, health and/or science field.

Requirements: ISG 5200, 5201, 5202, and 5203. It is recommended that the courses be completed in the order listed. Each required course taken must be passed with a grade of B- or higher to count toward the certificate requirements.

Dual Degree Programs

Dual Degree Programs are those that allow students to share credits between two separate degree programs provided that the degrees are completed and conferred together. The programs described below have been formally approved to allow credits to be shared; the final award of shared credit is contingent upon completion of both programs. Students who wish to complete multiple degrees not listed below must complete the requirements of each degree as described elsewhere in this or other University of Connecticut catalogs.

The program descriptions below primarily describe the ways the programs share credits and how the dual requirements differ from the requirements of each program. For more detailed information about each degree program's requirements, please refer to the program description elsewhere in this catalog.

Doctor of Dental Medicine (D.M.D.)/ Biomedical Science (Ph.D.)

The goal of the dual Doctor of Dental Medicine D.M.D./Biomedical Science Ph.D. program is to train the next generation of clinician-scientists, who become scholars, researchers and teachers in academia. The dual degree program allows students to integrate the curricula of the dental and graduate schools. The Ph.D. degree program is taken in Biomedical Science in one of the following areas of concentration: Cell Analysis and Modeling, Cell Biology, Genetics and Developmental Biology, Immunology, Molecular Biology and Biochemistry, Neuroscience, and Skeletal Biology and Regeneration.

Requirements

The requirements for the D.M.D. degree for dual degree students conform to the D.M.D. degree requirements laid out by the School of Dental Medicine.

The requirements in the Biomedical Science Ph.D. program for dual degree students conform to The Graduate School requirements.

- Specific course requirements for the Ph.D. in Biomedical Science are determined by the student's advisory committee consistent with the minimum requirements of The Graduate School.
- 15 credits of preclinical coursework in the D.M.D. can also be applied toward the credit requirements for the Biomedical Science Ph.D. program.
- A student in the dual degree program must take MEDS 5310, Responsible Conduct in Research, unless the student's advisory committee approves an equivalent course or training experience.
- The Ph.D. in Biomedical Science does not have a related area or foreign language requirement.
- Some students may be required to enroll in special courses to maintain their status at the School of Dental Medicine.

Juris Doctor (J.D.)/Business Administration (M.B.A.)

The dual Juris Doctor J.D./Business Administration M.B.A. degree allows highly motivated students to gain a competitive edge in law and business at an accelerated pace. The curriculum is designed for those whose career goals include domestic or international business, management, international finance or public service, as well as such specialized fields as tax accounting, investment management, corporate organization or the legal aspects of marketing.

The School of Law offers day and evening courses at its campus in the West End of Hartford, while the School of Business offers day and evening M.B.A. courses at its Graduate Business Learning Center in downtown Hartford, as well as evening courses at the Stamford and Waterbury regional campuses.

Requirements

Students complete all requirements for the J.D. degree, including a Law School course in Legal Ethics and Responsibility, a clinic or field placement to satisfy the Law School's practice based learning requirement, and an intensive, analytical paper to satisfy the Law School's writing requirement. In addition, students must complete all of the required core courses for the M.B.A. The dual program allows up to 15 of the course credits taken as part of the J.D. to also count as elective credits for the M.B.A. In total, students must earn at least 74 credits from the Law School and 42 from the M.B.A. program at the School of Business.

Juris Doctor (J.D.)/Public Administration (M.P.A.)

The dual Juris Doctor J.D./Public Administration M.P.A. program provides education and training in the concepts, skills, and techniques of intergovernmental relations, public management, financial administration, and human resource management. The program prepares students for careers as executives, policy officials and administrators in federal, state, or local government and in nonprofit organizations.

Requirements

Students complete all requirements for the J.D. degree, including a Law School course in legal ethics, a clinic or field placement to satisfy the Law School's practice-based learning requirement, and an intensive, analytical paper to satisfy the Law School's writing requirement. In addition, students must complete the required core courses for the M.P.A. program including an internship. The dual program allows up to 12 of the course credits taken as part of the J.D. to also count as credits for the M.P.A. and allows up to 12 of the course credits taken as part of the M.P.A. to also count as credits for the J.D. In total, students must earn at least 74 credits from the Law School and 30 credits from the M.P.A. program.

Juris Doctor (J.D.)/Public Policy (M.P.P.)

The dual Juris Doctor J.D./Public Policy M.P.P. program provides students with advanced training in policy formation, policy analysis, data management, and advanced quantitative and statistical decision making techniques. The program prepares students for careers as policy analysts, policy officials and administrators, research associates, program analysts, and finance/budget analysts in government, corporate, and nonprofit settings.

Requirements

Students complete all requirements for the J.D. degree, including a Law School course in legal ethics, a clinic or field placement to satisfy the Law School's practice-based learning requirement, and an intensive, analytical paper to satisfy the Law School's writing requirement. In addition, students must complete the required core courses for the M.P.P. program including an internship. The dual program allows up to 12 of the course credits taken as part of the J.D. to also count as credits for the M.P.P. and allows up to 12 of the course credits taken as part of the M.P.P. to also count as credits for the J.D. In total, students must earn at least 74 credits from the Law School and 30 credits from the M.P.P. program.

Business Administration (M.B.A.)/ Latina/o and Latin American Studies (M.A.)

The dual Business Administration M.B.A./M.A. in Latina/o and Latin American Studies program is offered in partnership with UConn's El Instituto for students interested in management in multi-national organizations. El Instituto offers day and evening courses at its campus in Storrs. The School of Business offers day and evening M.B.A. courses at its Graduate Business Learning Center in downtown Hartford, as well as evening courses at the Stamford and Waterbury regional campuses as well as online courses.

Requirements

This dual degree program consists of 72 credits of coursework distributed between Business Administration (42 credits) and Latina/o and Latin American Studies (30 credits). Students must complete all requirements for the M.A. degree and must demonstrate proficiency sufficient to participate in scholarly conversations and research in one language of the region related to their program of study (other than English). Students must also complete all of the required core courses for the M.B.A.

Business Administration (M.B.A.)/Engineering (M.Eng.)

The increased need for engineers with both technical and management background has led to a partnership between UConn's School of Engineering and School of Business that will allow students to simultaneously earn a Master of Business Administration (M.B.A.) and a Master of Engineering (M.Eng.) degree.

Requirements

The standard M.Eng. program is 30 credits and the standard M.B.A. program is 57 credits. Students in the dual M.B.A./M.Eng. program are exempt from 15 credits of electives in the M.B.A. curriculum, bringing the total number of credits to 72 (30 in M.ENG and 42 for the M.B.A.).

Students are required to complete all of the requirements for the M.Eng. degree. In addition, they are required to take a minimum of 42 credits in the M.B.A. program. These credits must include the core courses required for the M.B.A. program. The dual program allows up to 15 of the course credits taken as part of the M.Eng. to also count as elective credits for the M.B.A.

Business Administration (M.B.A.)/ Business Analytics and Project Management (M.S.)

The dual Business Administration M.B.A./M.S. in Business Analytics and Project Management (BAPM) program is designed to provide BAPM students with a grounding in strategic business planning, cost analysis and control, investment planning, operations management, effective selection of products and marketing, and an understanding of industry and competitive analysis.

The M.S. degree is offered at the School of Business in Hartford or Stamford. Dual degree students may take their M.B.A. courses at the M.B.A. programs offered in Hartford, Stamford, or Waterbury.

Requirements

The dual M.B.A./M.S. in BAPM degree program requires 79 credits: a minimum of 42 credits in the M.B.A. program (including successful completion of all M.B.A. core courses) and 37 credits in the M.S. BAPM program. The dual program allows up to 15 of the course credits taken as part of the M.S. BAPM to also count as elective credits for the M.B.A.

Separate applications must be filed for each of the two degree programs.

Business Administration (M.B.A.)/ Financial Risk Management (M.S.)

The dual Business Administration M.B.A./M.S. in Financial Risk Management (FRM) program is designed to provide FRM students with a grounding in strategic business planning, cost analysis and control, investment planning, operations management, effective selection of products and marketing, and an understanding of industry and competitive analysis.

The M.S. degree is offered at the School of Business in Hartford or Stamford. Dual degree students may take their M.B.A. courses at the M.B.A. programs offered in Hartford, Stamford, or Waterbury.

Requirements

The dual M.B.A./M.S. FRM degree program requires 75-78 credits. Students must take the required 33-36 credits in the M.S. FRM program. In addition, they must complete a minimum of 42 credits for the M.B.A. program, including all of the required core courses for the M.B.A. The dual program allows up to 15 of the course credits taken as part of the M.S. FRM to also count as elective credits for the MBA.

Separate applications must be filed for each of the two degree programs.

Business Administration (M.B.A.)/ Human Resource Management (M.S.)

The dual Business Administration M.B.A./M.S. Human Resource Management (HRM) program is designed to provide HRM students with a grounding in strategic business planning, cost analysis and control, investment planning, operations management, effective selection of products and marketing, and an understanding of industry and competitive analysis.

The M.S. degree in Human Resource Management is offered at the School of Business in Hartford and online. Dual degree students may take their M.B.A. courses at the M.B.A. programs offered in Hartford, Stamford, or Waterbury.

Requirements

The dual M.B.A./M.S. HRM degree program requires 75 credits. Students must take the required 33 credits in the M.S. HRM program. In addition, they must complete a minimum of 42 credits for the M.B.A. program, including all of the required core courses for the M.B.A. The dual program allows up to 15 of the course credits taken as part of the M.S. HRM to also count as elective credits for the M.B.A.

Separate applications must be filed for each of the two degree programs.

Business Administration (M.B.A.)/Nursing (M.S.)

The dual Business Administration M.B.A./M.S. in Nursing program is designed to prepare individuals for entrepreneurial and managerial careers in advanced practice nursing.

The School of Nursing offers online courses as well as day and evening courses at its campus in Storrs. The School of Business offers day and evening M.B.A. courses at its Graduate Business Learning Center in downtown Hartford, as well as evening courses at the Stamford and Waterbury regional campuses.

Requirements

Students in the dual degree M.B.A./M.S. in Nursing program are required to complete 44-48 credits (depending on the track) for the M.S. in Nursing and a minimum of 42 credits for the M.B.A. Students must complete all requirements for the M.S. degree. In addition, students must complete all of the required core courses for the M.B.A. The dual program allows up to 15 of the course credits taken as part of the M.S. to also count as elective credits for the M.B.A.

Business Administration (M.B.A.)/Social Work (M.S.W.)

The dual Business Administration M.B.A./Social Work M.S.W. program is designed to prepare individuals for managerial careers in social work in both the private and the public sectors.

The School of Social Work offers day and evening courses at its campus in the Hartford, while the School of Business offers day and evening M.B.A. courses at its Graduate Business Learning Center in downtown Hartford, as well as evening courses at the Stamford and Waterbury regional campuses.

Requirements

Students in the dual degree M.B.A./M.S.W. program must complete all of the requirements for the M.S.W. degree. In addition, they must complete all of the required core courses for the M.B.A. The dual program allows up to 15 of the course credits taken as part of the M.S.W. to also count as elective credits for the M.B.A. Students must take a minimum of 42 credits in the M.B.A. program.

Business Administration (M.B.A.)/Pharmacy (Pharm.D.)

The dual Pharmacy Pharm.D./Business Administration M.B.A. program is offered to highly motivated students who seek to combine pharmacy education with business managerial knowledge and skills. The program is designed to provide students with a grounding in strategic business planning, cost analysis and control, investment planning, health care systems and operation management, effective selection of products and marketing, and an understanding of industry and competitive analysis.

The School of Pharmacy offers day and evening courses at its campus in Storrs, while the School of Business offers day and evening M.B.A. courses at its Graduate Business Learning Center in downtown Hartford, as well as evening courses at the Stamford and Waterbury regional campuses.

Requirements

Dual degree Pharm.D./M.B.A. students complete the first two years of study in the School of Pharmacy. Students enroll in the M.B.A. program for the third year, and then return to the School of Pharmacy for the last two years of the Pharm.D. program, which consists of both pharmacy and business courses.

Students in the dual degree program must complete all of the requirements for the Pharm.D. degree. In addition, they must complete all of the required core courses for the M.B.A. The dual program allows up to 15 of the course credits taken as part of the Pharm.D. to also count as elective credits for the M.B.A. Students must take a minimum of 42 credits in the M.B.A. program.

Business Administration (M.B.A.)/ Biomedical Science (Ph.D.)

The combined Ph.D. in Biomedical Science/Business Administration M.B.A. program is designed to provide selected Ph.D. students with a thorough grounding in contemporary business by blending and balancing technical rigor, management theory, practical application and individualized concentrations.

Requirements

Students in this dual degree program must complete all of the requirements for the Ph.D. in Biomedical Sciences. In addition, they must complete the core courses required of the M.B.A. program. The M.B.A. program will accept 12 credits from the Ph.D. in Biomedical Science program as M.B.A. program electives. (Therefore, the dual degree students will be required to complete 45 credits out of the 57 credit M.B.A. program). The Ph.D. in Biomedical Science program will accept a varying number of credits from the M.B.A. program as electives. The number of credits will be determined by each student's advisory committee and the Director of the Area of Concentration, but will not exceed 12 credits. Dual degree students must have received the equivalent of a "B" in each course that they wish to transfer between the Ph.D. in Biomedical Science program and the M.B.A. program. This exchange of credits is only available to dual degree students. The M.B.A. program will not accept credits from graduates of the Ph.D. in Biomedical Science program nor will the Ph.D. in Biomedical Science program accept credits from the School of Business for graduates of the M.B.A. program.

The University of Connecticut's Graduate School requires that the dual Ph.D. in Biomedical Science/M.B.A. program be completed within eight years.

Doctor of Medicine (M.D.)/Business Administration (M.B.A)

The dual Doctor of Medicine M.D./Business Administration M.B.A. program is designed to provide medical students with a grounding in strategic business planning, cost analysis and control, investment planning, health care systems and operation management, effective selection of products and marketing, and an understanding of industry and competitive analysis. These are requirements of physicians who manage large health care organizations or even small practices.

Requirements

Students in the dual degree program must satisfy all of the requirements for the M.D. degree, as set by the School of Medicine. In addition, they are required to take a minimum of 42 credits in the M.B.A. program. These credits must include the core courses required for the M.B.A. program. The dual program allows up to 15 of the course credits taken as part of the M.D. to also count as elective credits for the M.B.A.

Some students may be required to enroll in special courses to maintain their status at the School of Medicine.

Doctor of Medicine (M.D.)/ Clinical and Translational Research (M.S.)

UConn Health offers a dual degree program leading to an M.D. and a Master of Science in Clinical and Translational Research. The M.S. degree program in Clinical and Translational Research is administered by the Connecticut Convergence Institute for Translation in Regenerative Engineering at the University of Connecticut. The program stresses clinical research methods and a research practicum to prepare students for doing independent research.

Requirements

The Dual degree program conforms to all UConn Graduate School requirements. Students enrolled in the UConn School of Medicine who apply to and are accepted to the dual program are eligible for a six-credit load reduction toward the M.S. in Clinical and Translational Research degree in recognition of coursework completed in the Stage 1 curriculum. Additional credits required for the M.S. in Clinical and Translational Research degree include nine credits of core course work, nine research practicum credits and at least six credits of elective course work approved by the M.S. in Clinical and Translational Research Executive Committee. Students may take an independent study (CLTR 5099) in place of an elective. For most dual degree students, all credits required for the M.S. degree will be completed during their fourth year at UConn (after the first three years of medical school).

The Scholarship and Discovery course capstone project required for the M.D. degree will be waived for students enrolled in the Dual M.D./M.S. in Clinical and Translational Research program. Instead, dual M.D./M.S. in Clinical and Translational Research students will complete their capstone projects as part of the M.S. curriculum. To fulfill the requirements of the capstone project (nine credits of research), students must submit a manuscript in journal format, a grant proposal, and also give an oral

presentation followed by questions and evaluation by program faculty consistent with the format of a thesis defense.

The M.S. 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 M.S. in Clinical and Translational Research Administrative Office at least three weeks prior to the student's final exam.

Elective Courses: Students choose from a list of approved courses. Although not required, students are encouraged to enroll in CLTR 5360. Examples of approved electives are: CLTR 5360; MEDS 5308, 5310, 6447; PUBH 5404, 5405, 5436, 5475, 5501, and 5504. Students may request permission from the M.S. in Clinical and Translational Research Executive Committee to enroll in an elective that is not on the list of approved courses.

Doctor of Medicine (M.D.)/Biomedical Science (Ph.D.)

The Doctor of Medicine M.D./Biomedical Science Ph.D. program trains students to be physician-scientists who will become scholars, researchers and teachers in academia. The dual degree program allows students to integrate the curricula of the medical and graduate school. The Ph.D. degree program is taken in Biomedical Science in one of the following areas of concentration: Cell Analysis and Modeling, Cell Biology, Genetics and Developmental Biology, Immunology, Molecular Biology and Biochemistry, Neuroscience, and Skeletal Biology and Regeneration.

Requirements

The requirements for the M.D. degree for M.D./Ph.D. students are set by the School of Medicine. The requirements in the Biomedical Science Ph.D. program for dual degree students conform to The Graduate School requirements. Specific course requirements for the Ph.D. in Biomedical Science are determined by the student's advisory committee consistent with the minimum requirements of The Graduate School.

- A student may list up to 15 credits of GRAD 6932 (Directed Studies for M.D./Ph.D. Students) on their Plan of Study.
- A student in the dual degree program must take MEDS 5310, Responsible Conduct in Research, unless the student's advisory committee approves an equivalent course or training experience.
- The Ph.D. in Biomedical Science does not have a related area or foreign language requirement.

Public Health (M.P.H.)/Doctor of Dental Medicine (D.M.D.)

The Department of Public Health Sciences offers an interdisciplinary dual degree program leading to a Doctor of Dental Medicine (D.M.D.) and Master of Public Health (M.P.H.). Students admitted to the UConn School of Dental Medicine who complete requirements for the UConn Certificate on Social Determinants of Health and Disparities (SDH&D) receive a 12-credit load reduction and are required to complete an additional 36 credits consisting of six required courses, three to five electives on topical areas of student interest and an Integrative Learning Experience consisting of either nine credits of GRAD 5950 or three credits of PUBH 5499. Students must maintain a cumulative grade point average (GPA) of 3.0. Grades below "B" in any foundational course or "C+" in any elective represent academic deficiencies that require a remediation plan approved by a student's major advisor and Program Director.

Required M.P.H./D.M.D. Courses: In addition to the requirements for completion of the D.M.D., students are required to take the following courses: PUBH 5403, 5404, 5405, 5406, 5407, and 5431.

Public Health (M.P.H.)/Juris Doctor (J.D.)

The Department of Public Health Sciences offers an interdisciplinary dual degree program leading to a Juris Doctor (J.D.) and Master of Public Health (M.P.H.). Students admitted to the UConn School of Law, upon successfully completing coursework on topics of health law, ethics and/or social policy, receive a 12-credit load reduction and are required to complete an additional 36 credits consisting of eight required courses, one to three electives on topical areas of student interest and an Integrative Learning Experience consisting of either nine credits of GRAD 5950 or three credits of PUBH 5499. Student must maintain a cumulative grade point average (GPA) of 3.0. Grades below "B" in any foundational course or "C+" in any elective represent academic deficiencies that require a remediation plan approved by a student's major advisor and Program Director.

Required M.P.H./J.D. Courses: In addition to the requirements for completion of the J.D., students are required to take the following courses: PUBH 5403, 5404, 5405, 5406, 5407, 5408, 5409, and 5431.

Public Health (M.P.H.)/Doctor of Medicine (M.D.)

The Department of Public Health Sciences offers an interdisciplinary dual degree program leading to a Doctor of Medicine (M.D.) and Master of Public Health (M.P.H.). Students admitted to the UConn School of Medicine who complete requirements for the UConn Certificate on Social Determinants of Health and Disparities (SDH&D) receive a 12-credit load reduction and are required to complete an additional 36 credits consisting of six required courses, three to five electives on topical areas of student interest and an Integrative Learning Experience consisting of either nine credits of GRAD 5950 or three credits of PUBH 5499. Student must maintain a cumulative grade point average (GPA) of 3.0. Grades below "B" in any foundational course or "C+" in any elective represent academic deficiencies that require a remediation plan approved by a student's major advisor and Program Director.

Required M.P.H./M.D. Courses: In addition to the requirements for completion of the M.D., students are required to take the following courses: PUBH 5403, 5404, 5405, 5406, 5407, and 5431.

Public Health (M.P.H.)/Social Work (M.S.W.)

The Department of Public Health Sciences offers an interdisciplinary dual degree program leading to a Master of Social Work (M.S.W.) and Master of Public Health (M.P.H.). Students admitted to the UConn School of Social Work, upon successfully completing coursework on topics of human and social service delivery, receive a 12-credit load reduction and are required to complete an additional 36 credits consisting of six required courses, three to five electives on topical areas of student interest and an Integrative Learning Experience consisting of either nine credits of GRAD 5950 or three credits of PUBH 5499. Student must maintain a cumulative grade point average (GPA) of 3.0. Grades below "B" in any foundational course or "C+" in any elective represent academic deficiencies that require a remediation plan approved by a student's major advisor and Program Director.

Required M.P.H./M.S.W. Courses: In addition to the requirements for completion of the M.S.W., students are required to take the following courses: PUBH 5403, 5404, 5406, 5407, 5408, and 5409.

Public Health (M.P.H.)/Pharmacy (Pharm.D.)

The Department of Public Health Sciences offers an interdisciplinary dual degree program leading to a Doctor of Pharmacy (Pharm.D.) and Master of Public Health (M.P.H.). Students admitted to the UConn School of Pharmacy, upon successfully completing coursework on topics of health and health care delivery, receive a 12-credit load reduction and are required to complete 36 credits consisting of eight required courses, one to three electives on topical areas of student interest and an Integrative Learning Experience consisting of either nine credits of GRAD 5950 or three credits of PUBH 5499. Student must maintain a cumulative grade point average (GPA) of 3.0. Grades below "B" in any foundational course or "C+" in any elective represent academic deficiencies that require a remediation plan approved by a student's major advisor and Program Director.

Required M.P.H./Pharm.D. Courses: In addition to the requirements for completion of the Pharm.D., students are required to take the following courses: PUBH 5403, 5404, 5405, 5406, 5407, 5408, 5409, and 5431.

Social Work (M.S.W.)/Juris Doctor (J.D.)

In cooperation with the UConn School of Social Work, the School of Law offers student the opportunity to earn a dual degree of Juris Doctor J.D./Social Work M.S.W. The J.D./M.S.W. degree is designed for students who are interested in the social impact of the legal system upon individuals. Students pursue this degree to prepare for careers in fields such as public interest law, mental health law, elder law, women's rights, penology, juvenile advocacy, human services administration, community organizing and public policy and planning. The dual degree program is highly individualistic in nature in order to provide each student with the best possible combination of these two disciplines. Students in the dual degree program may obtain both degrees in four years, compared with five years, if both degrees were pursued separately.

Requirements

Study is generally begun at the School of Law, where during the first year students will complete a minimum of 33 credits of required curriculum study. During the second year, students will complete a minimum of six Social Work courses, their first year field placement and a minimum of two Law courses. Year three will consist of a minimum of three Social Work courses, their second field placement, a Law School clinical experience (which coordinated in combination with the School of Social Work, can apply toward the second year field placement requirement of 560 hours), and six courses at the School of Law. During year four, students will take all remaining credits. Additionally, all students must comply with the rules regarding credit load limitations. Without prior approval from the Associate Dean of the Law School, full time students may not exceed 16 credits and part time students may not exceed 12 credits per semester. Permission may be granted by the Law School for 17 credits. The limit per semester at the School of Social Work is 17 credits.

Transfer Agreement

The J.D. degree program requires completion of 86 credits (including all required first-year courses, Legal Profession (LAW 7565), completing intensive, analytical paper(s) which satisfies a writing requirement, and course work which satisfies the Practice Based Learning requirement). The M.S.W. degree program requires completion of 60 credits (including Social Work foundation, concentration courses in the student's selected concentration, two field placements, electives and research). The School of Law will accept 12 credits from among a student's advanced M.S.W. courses for transfer. The School of Social Work will accept nine elective credits of non-clinical work earned at the School of Law; this is achieved by reducing the number of required credits for the program.

Law Courses Acceptable for Transfer to the M.S.W. Program

- Administrative Law
- Children and the Law
- Center for Children's Advocacy
- Elder Law
- Employment Discrimination Law
- Family Law
- Law and Medicine
- Mental Health Law
- Street Law

M.S.W. Courses Acceptable for Transfer to the J.D. Program

The School of Law will accept 12 credits from the student's M.S.W. program.

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 Office of the Registrar'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 Instructors

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, others with permission. 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, others with consent. Not open 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. Prerequisite: Must be taken concurrently with 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 or fulfillment of prerequisites required for admission to MSA, others with permission.

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. Ethics and the Accounting Professional Environment

Three credits. Prerequisite: Open only to Accounting M.S. students.

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. Recommended preparation: ACCT 5572.

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 and 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. Prerequisite: This course may not be taken by MBA students, who should instead take BLAW 5175.

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. Data Analytics: Skills for Accountants

Three credits. Prerequisite: Department consent.

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. Data Analytics: Accounting Applications

Three credits. Prerequisite: Department consent.

Covers practical issues such as dealing with errors in data and preparing accounting data for analysis. Additional techniques for dealing with data anomalies are explored. This technical, hands-on course prepares students for entry level accounting data analysis.

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.

5570. Taxation of Business Entities - Flow Through Entities

Three credits. Prerequisite: Department consent.

Application of basic tax concepts to business entities, with particular emphasis on flow through entities. At the end of the course, students should be able to identify and address the tax issues faced when forming, operating, and liquidating a flow through entity.

5571. Taxation of Business Entities: C Corporations

Three credits. Prerequisite: Department consent.

Application of basic tax concepts to business entities, with particular emphasis on C corporations. At the end of the course, students should be able to identify and address the tax issues faced when forming, operating, and liquidating a C corporation.

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 of Income Taxes

Three credits.

Focuses on the financial reporting provisions related to federal, foreign, and state income taxes. Students will learn how to calculate income tax amounts reported on the income statement and balance sheet and prepare the income tax footnote and related disclosures.

5584. Advanced Accounting

Three credits. Prerequisite: Not open to students who have passed ACCT 4203.

An in-depth study of accounting for business combinations. Coverage also includes contemporary issues in financial accounting, such as multinational entities and partnerships.

5584. Special Topics in Accounting

Variable (1-3) credits. Prerequisite: ACCT 5121 or 5182 or fulfillment of prerequisites required for admission to MSA, others with permission. May be repeated for a total of 9 credits.

Investigation and discussion of special topics in accounting.

5585. Independent Study in Accounting

Variable (1-6) credits. May be repeated for a total of 9 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. May be repeated for a total of 9 credits.

6201. Introduction to Accounting Research

Three credits. May be repeated for a total of 6 credits.

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 total of 8 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.

Administration (Social Work) (ADMN)

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. Corequisite: 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 & Fiscal Responsibilities for Social Administrators

Three credits. Prerequisite: ADMN 5301, FED 5352 and FED 5302; open to M.S.W. students in the Administration concentration. Corequisite: 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 to MSW 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 5302 and 5352; open only to M.S.W. students in the Administration concentration. Corequisite: ADMN 5302 or POPR 5310, and FED 5310.

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required course for students in the Administration concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5354. Field Education in Administration IV

Four credits. Prerequisite: Open only to M.S.W. students in the Administration concentration.

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required course for students in the Administration concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5355. Block Placement in Administration

Eight credits. Prerequisite: FED 5352 and 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.

Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Advanced Manufacturing for Energy Systems (AMES)

5101. Engineering Analysis

Three credits. Prerequisite: Open to graduate students only.

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.

5111. Computer Aided Engineering

Three credits. Prerequisite: Open to graduate students only.

Introduction to computational methods in design and analysis of materials, processes, and systems related to advanced manufacturing and energy systems. Topics covered include computational materials, process simulation, computational fluid dynamics, finite element analysis, and manufacturing process simulation.

5121. Engineering Communication

Three credits. Prerequisite: Open to graduate students only.

Development of the advanced communication skills as well as the information management required of engineers and engineering managers in industry, government and business. Focus on the design and writing of technical reports, articles, proposals, and the 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.

5410. Introduction to Energy Management in Manufacturing

Three credits. Prerequisite: Open to graduate students only.

Introduction to foundational concepts and methods of energy management in manufacturing including: the motivation of energy efficient manufacturing, systematic methods for energy consumption modeling and analysis in manufacturing enterprises and facilities, including lighting, motors and drives, compressed air, process heating/cooling, HVAC, identification of energy sinks and energy saving opportunities in manufacturing, ISO 50001 standards on energy management, and a basic introduction of the whole building energy simulation program EnergyPlus(TM).

5420. Introduction to Smart and Green Manufacturing

Three credits. Prerequisite: Open to graduate students only.

Introduction to foundational concepts and methods of smart manufacturing and green manufacturing. Discusses the impacts of smart technologies and initiatives such as Industry 4.0

in Europe, National Network of Manufacturing Innovation Institutes established in the U.S., and Made-in-China 2025 on manufacturing. Includes the architecture of smart manufacturing, sensing technology, internet-of-things, cloud manufacturing/manufacturing as a service, basic data analytics for diagnosis and prognosis in manufacturing. Covers fundamental issues in green manufacturing, such as the metrics, principles, and societal/business/policy impacts, as well as fundamental methods such as lifecycle assessment and sustainability assessment of manufacturing.

5441. Reliability Engineering

Three credits. Prerequisite: Open to graduate students only.

Reliability theory with specific application to manufacturing or complex systems. Generalized and probabilistic basics of reliability theory. Basic reliability modeling and analysis tools including fault trees, reliability diagrams, and Markov reliability models. Faults specific to electric drive components, i.e., electric machines, power electronics, control, and sensing. Techniques for evaluating or estimating failure rates of these components along with factors that impact these failure rates such as the environment, humidity, temperature, etc. Application to a simple process as a course project.

5451. Optimization-based Production Management

Three credits. Prerequisite: Open to graduate students only.

An introduction to models and methods for production management in modern manufacturing systems. Topics include manufacturing in America and lessons from history; basic factory dynamics; production planning and scheduling; Just-In-Time and lean operations; manufacturing resource planning; capacity management; aggregate planning; supply chain management; project management; energy modeling in manufacturing; Industry 4.0 and its impacts. Most topics will be presented within a unifying optimization framework, and solved by using methods such as linear programming, branch-and-cut, and our latest decomposition and coordination approach plus formulation tightening.

5461. Production Systems Engineering for Energy Efficient Manufacturing

Three credits. Prerequisite: Open to graduate students only.

Production Systems Engineering (PSE) is a branch of Engineering intended to uncover fundamental laws that govern manufacturing systems (e.g., serial production lines and assembly systems) and exploit them for the purposes of analysis, design, and management. Fundamental principles in PSE will be described along with numerous case studies in large volume industries (such as automotive, electronics, consumer productions, etc.). The material presented is based on first principles rather than on recipes. How to apply the PSE theory in analysis and control of manufacturing systems for energy efficient production will be covered. The PSE Toolbox and Simul8 will be used to facilitate the application of the theoretical material.

5895. Special Topics in Advanced Manufacturing for Energy Systems

Variable (1-4) 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 Program Director before announcement of the course.

African Studies (AFRI)

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.

Africana Studies (AFRA)

5100. Impacts of Race on Health Equity and Medical Research and Practice

(Also offered as CLTR 5100.) Three credits. Prerequisite: Open to 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.

6470. Racial Justice and Decoloniality in Higher Education Teaching

(Also offered as EDLR 6470 and LLAS 6470.) Three credits. Recommended preparation: EDLR 5201, 6467; GRAD 6000, 6001.

Theory and practice of how teaching within a higher education context can work toward racially equitable learning experiences and decoloniality of the classroom.

Agricultural and Resource Economics (ARE)

5150. Microeconomic Foundations

Three credits.

Theory and tools of the foundations of microeconomic theory as applied to problems and policy issues in agriculture, natural resources, development, and the environment. Topics include supply, demand, market equilibrium, consumer and producer behavior, perfect competition, and welfare economics.

5201. Microeconomics

Three credits.

Beginning graduate microeconomics covering consumer and producer theory, price determination, economic efficiency, and welfare analysis.

5203. Economics Methodology: Praxis and Practice

Three credits. Prerequisite: M.S. student in ARE, or ARE major with Senior standing and instructor approval.

Philosophical foundations of economics as a science and economic research. Developing skills

for planning, performing, reporting, and evaluating economic research. Critical thinking about the research process, reading about and discussing research methodology, analyzing the logic and reasoning of other economists' research articles, and developing a research project.

5205. Market Planning and Survey Research in the Food Industry

Three credits. Prerequisite: ARE 3333 or similar course. Not open for credit to students who have passed ARE 4205.

Overview of market planning in the food industry, with emphasis on survey design and implementation. Graduate students will lead teams of undergraduates as they work with clients to develop tailored market plans.

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. Sustainable Economic Development

Three credits.

The role of sustainable economic development of less developed economies. Microeconomic dimensions of agricultural development, food security, agricultural production and supply, foreign assistance, and government programming.

5311. Applied Econometrics I

Three credits.

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.

5353. Data Ethics and Equity in the Era of Misinformation

Two credits.

This course will introduce students to issues of ethics and equity in the contemporary practice of data science. The ability to collect, store, process,

and analyze ever greater amounts of data offers great opportunities, as well as potential perils. This course will provide examine the ethical implications of data collection, usage, and distribution. Topics will include systematic approaches to assessing ethical issues; privacy and confidentiality; defining research and the responsibilities associated with conducting ethical research; implicit and structural biases in data collection and analysis.

5438. Climate Economics

Three credits. Prerequisite: This course and ARE 3438E may not both be taken for credit.

Analysis of the interactive relationship between the economy and climate change. Use of advanced principles and tools of economics to focus on the costs of changes in the severity and frequency of weather events, how these costs are influenced by markets and policies, and how costs and benefits are distributed across populations within the U.S and across the globe in the short and long terms. Examination of household, firm-level, national and international decision-making as influenced by climate change, taking into account uncertainty, diverging interests, external costs, and evaluation of models used to alternative scenarios.

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.

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.

5476. International Trade and Policy

Three credits. Prerequisite: ARE 5201 or ECON 5201; ARE 5311 or ECON 5312 (or equivalents).

Analysis of international trade and trade policy focusing on agricultural and food markets. Covers trade-related issues concerning economic development and growth. Focus on current challenges to the multilateral trading system and the theoretical foundation for understanding the economic importance of firms, international trade, and global capital flows. Introduction of methods and tools for counterfactual evaluation of trade policies. Statistical modeling techniques to analyze trade patterns and measure trade policy effects.

5480. Effective Teaching Strategies and Course Design in Applied Economics

Variable (1-3) credits. Prerequisite: Open only to graduate students, instructor's consent is required. May be repeated for a total of 3 credits.

Introduction to course development and strategies for effective teaching. Students will be expected to attend teaching workshops, meet weekly with the instructor and their peers to discuss teaching-related topics, and work on developing their course materials including syllabi, course learning goals, lectures, and assessments. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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. 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.

Professional or project based work in applied economics and policy related to agribusiness management, marketing and financial analysis, food systems, environmental and resource management, sustainability, or economic development. Requires a learning agreement and student's advisor approval.

5992. Practicum in Economic Development

Variable (1-6) credits. May be repeated for a total of 6 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.

5993. Teaching Practicum in Applied Economics

Variable (1-6) credits. Prerequisite: Open only to graduate students. May be repeated for a total of 6 credits.

Teaching practicum in the field of applied economics and policy related to agribusiness management, marketing and financial analysis, food systems, environmental and resource management, sustainability, economic development, and data analysis. Requires a learning agreement and student's advisor approval. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6203. Economics Methodology: Praxis and Practice

Three credits. Prerequisite: Instructor consent; open to Ph.D. students in ARE (or Ph.D. students in Economics with Permission). Recommended preparation: One year of Ph.D. coursework in ARE (or Economics).

Philosophical foundations of economics as a science and economic research. Developing skills for planning, performing, reporting, and evaluating economic research. Critical thinking about the research process, reading about and discussing research methodology, analyzing the logic and

reasoning of other economists' research articles, and developing a research project.

6305. Applied Development Economics

Three credits. Prerequisite: ARE 5311 or ECON 5311 or equivalent. Recommended preparation: ARE 5201 or ECON 5201 or equivalent.

Overview of the current applied literature on the microeconomics of development in poor countries, as well as examples from the US. Topics include the role of land policies, agriculture, human capital, health, education, the internal structure of households (neoclassical and bargaining) and the functioning of markets.

6311. Applied Econometrics I

Three credits.

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

(Also offered as ECON 6466.) 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. Prerequisite: ARE 5201 or ECON 5201 or equivalent.

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; 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

Three credits. Prerequisite: ARE 5201, ECON 5201, or equivalent. Recommended preparation: ECON 6201 or equivalent; ARE 6311, ECON 6310, or equivalent.

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.

6478. Empirical International Trade and Investment

Three credits. Prerequisite: ECON 6201, 6211; ARE 6311, 6313 (or equivalents), instructor consent required.

Empirical aspects of international trade, foreign investment, and the environment. Issues related to testing various trade models. Selected topics include testing trade models, gravity models, linkages between openness and growth, trade orientation and firm performance, trade patterns, trade and the environment, and labor markets and trade. Emerging topics in international economics with a focus on empirical applications. Use of advanced statistical modeling and data visualization techniques.

6495. Graduate Research Seminar

One credit. May be repeated for a total of 12 credits.

Participation in research seminars presented by invited scholars and departmental faculty as well as active presentation of students' own research to

colleagues and faculty. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6695. Special Topics

Variable (1-3) credits. 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.

Agriculture and Natural Resources (AGNR)

5095. Special Topics

Variable (1-6) credits. 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.

Allied Health Sciences (AH)

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 credit.

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 6 credits.

Advanced study, project, or research of intensive, independent investigation in allied health consistent with the student's needs, interests and plan of study.

5200. Design and Methodology of Behavioral Trials

Three credits. Prerequisite: AH 6306 or equivalent as approved by the instructor.

Examines various types of clinical trials (e.g., pilot feasibility, efficacy, effectiveness, implementation, and dissemination) and methodological issues pertinent to randomized trials testing behavioral interventions; including intervention development, pilot and feasibility testing, control groups, internal and external

validity, treatment receipt and fidelity, adherence, recruitment, and blinding.

5275. HAZWOPER

Three credits. Prerequisite: Not open to students who have successfully completed AH 3275.

Provides individuals the necessary knowledge and training to meet the criteria for certification recognized by the Occupational Safety and Health Administration (OSHA) in work activities related to hazardous waste sites and cleanup operations involving hazardous substances. Optional field exercise. Only students who successfully complete both the academic and hands-on field exercise offered within this course will receive a 40-hour HAZWOPER certificate.

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 a total of 24 credits.

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: AH 5314, which may be taken concurrently; open only to non-thesis (Plan B) students; instructor consent required. May be repeated for a total 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.

5330. Italy's Mediterranean Food and Our Health

Three credits. Prerequisite: Open to NUSC and DIET majors, others by consent of instructor. Not open for credit if previously passed AH 2330.

Production and processing of the characteristic foods of Italy. Summary of the Italian Mediterranean diet: definitions, culture, history, food consumption patterns, nutrient composition and potential health benefits. Emphasis on the difference in diet between Italians and Americans in relation to the health differences between the two populations. May not be counted toward the Allied Health Sciences major's group A or science elective requirements. Taught concurrently with AH 2330. CA 4-INT.

5335. Community Nutrition Education and Behavioral Intervention Delivery for At-Risk Groups

Two credits. Prerequisite: Students must earn a "C" or higher in DIET 3215, 3230, 3231W, 3235, 3250, 3272.

Community nutrition experiences with income-challenged individuals and families aligned with the model of health promotion sciences and towards achieving entry-level competence in community nutrition and public health.

5350. Advanced Medical Nutrition Therapy

Three credits. Prerequisite: Open only to Dietetics majors, others by consent of the Director of Dietetics.

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.

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 4272, 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.

5392. Health Promotion through Foodservice: Advanced Management Practicum I

One credit. Prerequisite: Student must earn a "C" or better in DIET 3150, 3155; open only to Dietetics majors, others by consent of Dietetics Program Director.

Supervised practice experiences in food service settings to promote health and wellbeing through delivery of healthy, safe, culinarily pleasing food which meets budgetary constraints with efficiency. Culminating project utilizing project management skills by implementing a healthy cooking class involving planning and scheduling, marketing, healthy menu development, teaching, budgetary needs and cost control, continuous quality improvement, and program evaluation.

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 PATH 5632.) Three credits.

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. Formerly offered as PVS 5632.

5700. Ethical Considerations in Genetic Testing and Research

Three credits. Prerequisite: Instructor consent. Recommended preparation: A course in human genetics.

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. Recommended preparation: A course in human genetics. May be repeated for a total of 2 credits.

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. Prerequisite: Instructor consent. Recommended preparation: A course in human genetics. May be repeated for a total of 18 credits.

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.

6015. Analysis of Large Population-Based Datasets for Health Promotion

Three credits. Prerequisite: AH 3005, AH 5005, or equivalent biostatistics course and familiarity with SAS; instructor consent.

Methods for using large population-based health-related datasets for health promotion research. Topics include procedures for accessing data, strengths and limitations of these data for health promotion research, complex sampling and weighted statistical analyses, and interpretation and communication of findings.

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; a graduate statistics course; instructor consent required; open only to doctoral students after first semester of doctoral work. May be repeated for a total of 6 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

Variable (1-4) credits. May be repeated for a total of 8 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.

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.

6310. Introduction to Systems Science and Complexity

Three credits. Prerequisite: Pre-calculus or higher, and statistics covering topics including regression analysis; instructor consent required.

An introduction to the basic concepts and characteristics of complex systems, as well as useful tools to study complex behavioral and social systems (with examples in health), such as social network analysis, system dynamics modeling and agent-based modeling.

6324. Critical Issues in Health Promotion, Disease and Disability Prevention

Three credits.

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.

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.

6422. Writing Scientific Grant Proposals and Papers

Three 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.

American Studies (AMST)

6000. American Studies: Methods and Major Texts

(Also offered as ENGL 6800 and HIST 6000.) Three credits. Prerequisite: Open to graduate students in English, History, and Political Science; open to others with consent.

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: Keywords

(Also offered as ENGL 6850 and HIST 6850.) Three credits. Prerequisite: Open to graduate students in English, History, and Political Science; open to others with consent. May be repeated for a total of 6 credits.

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.

Animal Science (ANSC)

5601. Experimental Design in Animal Science

Three credits.

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.

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.

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

One credit. May be repeated for a total of 3 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.

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.

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. May be repeated for a total of 3 credits.

Mentored experience in developing and presenting lectures and/or laboratory activities for existing ANSC undergraduate courses.

5692. Research

Variable (1-6) credits. 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.

A discussion-based class that prepares students to make oral presentations.

5694. Animal Science Seminar

One credit. May be repeated for a total of 2 credits.

Students present a seminar on the topic of their thesis research.

5695. Special Topics in Animal Science

Variable (1-6) credits. May be repeated for a total of 6 credits.

May be repeated for credit with a change of topic.

5699. Independent Study

Variable (1-3) credits. May be repeated for a total of 12 credits.

Anthropology (ANTH)**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.

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.

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.

5317. Environmental Anthropology

Three credits. Recommended preparation: Strong background in the one or more of the four fields of anthropology.

Examines the theories and methods of environmental anthropology and its application to contemporary human-environmental problems including climate change, environmental degradation, and environmental injustice.

5321. Ethnographic Methods I

Variable (1-3) credits. May be repeated for a total of 9 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. May be repeated for a total of 6 credits.

Selected topics in ethnographic methods and research design.

5325. 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.

5326. 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.

5327. Propaganda, Disinformation, and Hate Speech

(Also offered as HRTS 5327.) Three credits. Prerequisite: Not open for credit to students who have passed ANTH/HRTS 3230 or ANTH 5305 when offered as Propaganda, Disinformation, and Hate Speech.

Draws on current social science research and legal scholarship to understand the effects of disinformation and hate speech on individual moral decision-making, as well as on wider politics and culture. Evaluates various private and public initiatives to regulate speech.

5331. Cognitive Science of Religion

Three credits.

Theoretical debates and methodological approaches to the cognitive and evolutionary study of religious thought and behavior. Key topics include religious transmission, theological incorrectness, magical thinking, and psychosocial functions of religion and ritual.

5332. Cognitive Anthropology

Three credits.

Study of how the content of thought or knowledge, is created, organized, and distributed in human communities. Topics include cultural models of the mind, emotions, personality, and relationships.

5333. Evolution and Cognition

Three credits.

An 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.

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.

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.

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.

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.

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.

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.

5389. Population Ecology

Three credits.

Survey of theory and observations bearing on the causes and consequences of changes in fertility and mortality rates, and in the configuration of causes of mortality and morbidity in human populations.

5395. 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.

5398. Variable Topics

Three credits.

With a change in content, may be repeated for credit.

5399. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

5400. Introduction to Stable Isotopes

Three credits. Prerequisite: Open to graduate students only.

Introduction to stable isotope theory, methodology, and applications.

5450. Paleoclimate Reconstruction

Three credits. Prerequisite: Open to graduate students only.

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 to graduate students in Anthropology, others with 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.

Interdisciplinary understanding of the biological, cultural, technological and behavioral evolution of Neanderthals and their societies.

5512. Modern Human Origins

Three credits.

The earliest modern people in Africa: their way of life seen from the archaeological, fossil, and genetic evidence.

5513. Modern Human Dispersals

Three credits.

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.

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.

Investigation of recent and prehistoric hunter-gatherer societies informed by human behavioral ecology, archaeology, and ethnoarchaeology.

5522. Ecological Anthropology

Three credits.

Interdisciplinary study of human ecology integrating ecological and anthropological theory with archaeological, historical, and contemporary case studies.

5609. Quantitative Zooarchaeology

Three credits.

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.

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 required. Recommended preparation: ANTH 5706.

Archaeological problem-solving using archaeobotanical 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.

5800. Race in the Formation of the Human Sciences

(Also offered as LLAS 5800, POLS 5800, and PHIL 5800.) Three credits. Prerequisite: Not open for credit to students who have passed PHIL 5380.

Exploration of how race and the human sciences emerged out of the theological, epistemological, and political upheavals that resulted in the Euromodern world.

Applied Linguistics and Discourse Studies (ALDS)

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 LCL, 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 LCL, 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 LCL, 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.

5324. Teaching for Intercultural Citizenship and Human Rights I

(Also offered as CLCS 5324 and GERM 5324.) Three credits.

Explores the role of intercultural competence and human rights education from a variety of perspectives, including applied linguistics, education, psychology, neuroscience, philosophy, and pragmatics. Through readings, online and face-to-face discussions, role-plays, scenarios, and presentations students will critically reflect on models of intercultural competence and human rights education and their relation to (student) outcomes; examine the role of social justice and human rights within the teaching of intercultural competence; and integrate and assess intercultural competence in teaching. Taught in English.

5325. Teaching for Intercultural Citizenship and Human Rights II

(Also offered as CLCS 5325 and GERM 5325.) Three credits. Prerequisite: ALDS 5324 or CLCS 5324 or GERM 5324 or instructor consent.

Continued exploration of the role of intercultural competence and human rights education from a variety of perspectives, including applied linguistics, education, psychology, neuroscience, philosophy and pragmatics. Students will design a research project or curricular unit for a specific purpose in which they apply models of intercultural competence/ citizenship and human rights in practice. Taught in English.

5385. Special Topics

Three credits. May be repeated for a total of 6 credits.

5388. Variable Topics

Three credits. Prerequisite: Prerequisites and recommended preparation vary. May be repeated for a total of 6 credits.

5399. Independent Study

Variable (1-6) credits. May be repeated for a total of 12 credits.

Art (ART)

5301. Graduate Studio Art (Ceramics)

Variable (3-6) credits. Prerequisite: Open to students in Studio Art, others with consent. May be repeated for a total of 24 credits.

5303. Graduate Studio Art (Painting)

Variable (3-6) credits. Prerequisite: Open to students in Studio Art, others with consent. May be repeated for a total of 24 credits.

5304. Graduate Studio Art (Photography)

Variable (3-6) credits. Prerequisite: Open to students in Studio Art, others with consent. May be repeated for a total of 24 credits.

5305. Graduate Studio Art (Printmaking)

Variable (3-6) credits. Prerequisite: Open to students in Studio Art, others with consent. May be repeated for a total of 24 credits.

5306. Graduate Studio Art (Sculpture)

Variable (3-6) credits. Prerequisite: Open to students in Studio Art, others with consent. May be repeated for a total of 24 credits.

5307. Graduate Studio Art (Drawing)

Variable (3-6) credits. Prerequisite: Open to students in Studio Art, others with consent. May be repeated for a total of 24 credits.

5308. Graduate Studio Art (Video)

Variable (3-6) credits. Prerequisite: Open to students in Studio Art, others with consent. May be repeated for a total of 24 credits.

Open to students in studio art, others with permission.

5309. Graduate Studio Art (Performance)

Variable (3-6) credits. Prerequisite: Open to students in Studio Art, others with consent. May be repeated for a total of 24 credits.

5310. Graduate Art Seminar

Three credits. Prerequisite: Open to students in Studio Art, others with consent. May be repeated for a total of 12 credits.

Discussions, readings, and analyses relating current studio work to contemporary trends in art.

5320. Issues in Art Criticism

Three credits. Prerequisite: Open to students in Studio Art, others with consent.

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 to students in Studio Art, others with consent. May be repeated for a total of 18 credits.

Special course work that combines resources in art and/or areas outside of art.

5340. Studio Art Instruction and Curriculum Planning

Three credits. Prerequisite: Must be taken in the second semester in the initial program year by all graduate students with teaching appointments.

Teaching methods, strategies, and curriculum planning in studio art instruction.

5383. Special Topics in Studio Art

Three credits. 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 to students in Studio Art, others with consent. May be repeated for a total of 18 credits.

5397. M.F.A. Project

Six credits. Prerequisite: Open to students in Studio Art, 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 to graduate students only.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5320. Issues in Art Criticism

Three credits. Prerequisite: Open to graduate students only. May be repeated for a total of 6 credits.

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 to graduate students only.

Issues facing curators working in the arena of contemporary art today in a globalized art world.

5340. Advanced Studies in Museum and Exhibition Practices

Three credits. Prerequisite: ARTH 5321 and ARTH 5322.

Contemporary and theoretical issues in museum and exhibition practices directed toward their application in various internship contexts. Components vary. May be offered online or as seminar.

5370. Issues in Contemporary Art

Three credits. Prerequisite: Open to graduate students in Studio Art and Art History, others with instructor consent.

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. 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. May be repeated for a total of 6 credits.

Independent study in Art History.

5397. Museum Studies Internship

Three credits. May be repeated for a total of 6 credits.

Internship practicum in museum, gallery, or other curatorial context.

5570. History and Theory of Digital Art

Three credits. Prerequisite: Open to graduate students in the Master of Fine Arts, Digital Media and Design Master of Fine Arts, and Arts Administration Master of Fine Arts programs; others by permission, instructor consent required.

Investigation of forms of digital and Internet art and the forgotten histories of the technologies behind them. Forms of digital and Internet art to be explored include games/gaming, surveillance art, cyberfeminism, data visualization, and crowd sourced art, among others.

Basics (Social Work) (BASC)

5300. Human Oppression: The African-American and Puerto Rican Perspective

Three credits. Prerequisite: Open to Social Work MSW and non-degree students.

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 to students in the MSW program.

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 to Social Work MSW and non-degree students.

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 to Social Work MSW 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: BASC 5362, which may be taken concurrently. Corequisite: BASC 5391; 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: BASC 5362, which may be taken concurrently. 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. 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

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.

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 and 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; open to students in the M.S. Biomedical Engineering Clinical Engineering Internship Program or the M.Eng. Clinical Engineering Program.

Covers engineering solutions to problems that are found in the healthcare environment. Includes a 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, project management, functionality and design implications of emerging technologies, and 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.

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 walkthrough.

5080. Medical Device Cybersecurity

Three credits. Prerequisite: Instructor consent.

Today's medical devices are increasingly complex, integrated, and ubiquitous. However, these same characteristics increasingly expose medical devices to a growing number of cyber security risks. Compounding the challenge, safeguards that are appropriate for traditional IT equipment cannot easily be applied to medical devices. This course is designed to provide health technology professionals with an overview of the challenges and foundational knowledge on the topic of medical device security. The course will also offer specific guidance, skill sets, and tools appropriate for those professionals that can be used in mitigating security risks that exist in the expanding medical device ecosystem.

5099. Independent Study

Variable (1-3) credits. May be repeated for a total of 18 credits.

Individual exploration of special topics as arranged by the student with an instructor of his or her choice.

5100. Physiological Modeling

Three credits. Recommended preparation: BME 3100 and 3400 (or equivalent).

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 ECE 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. Prerequisite: Not open 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.

5320. Biosensors and Nanodevices for Biomedical Applications

Three credits. Prerequisite: Open only to Biomedical Engineering majors, others by instructor consent. Not open for credit to students who have passed BME 3320, 4985 or 6086 when taught as "Biosensors and Nanodevices for Biomedical Applications."

Current and emerging technologies in biosensors for biomedical applications. Topics include principles of molecular and bio/chemical sensing, techniques for sensor integration, nano/micro electro mechanical systems (NEMS/MEMS) technologies used in biosensors, and commercial/clinical applications of biosensors.

5339. Introductory Ergonomics for Biomedical Scientists and Engineers

Three credits. Prerequisite: BME 5600. Recommended preparation: BME 3600, 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.

5520. Developing Mobile Apps for Healthcare

Three credits. Recommended preparation: A laptop with at least 8G memory is needed for the class.

Mobile apps for smartphones and tablets are changing the way doctors and patients approach health care. This course will cover the basic elements of apps development on Android platforms, including XML, Java, UI amongst others. Topics include how to handle data in the cloud using HIPAA-Compliant web service and how to integrate machine learning models in app development. No previous programming experience is needed.

5600. Human Biomechanics

Three credits. 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.

5630. Multiphysics Finite Element Analysis

Three credits. Prerequisite: BME 3600 or instructor consent. Recommended preparation: Course is designed for BME juniors and seniors who have taken BME 3600, and for graduate students with generic background in mechanics.

Fundamentals of the finite element method (FEA) via hands-on experience of solving typical design problems in the multidisciplinary field of biomedical engineering, including mechanical structures, heat transfer, fluid flow and electrical field distribution. Emphasizes basic mathematical and physical principles underlying the FEA, general procedure of identifying and solving engineering problems using COMSOL Multiphysics FEA software, interpretation of FEA analysis results and evaluation of the quality of the numerical solution. Students are expected to demonstrate a basic understanding of the concepts and mathematical formulation of FEA, and possess the ability to apply FEA procedures in biomedical problems and technology development.

5700. Biomaterials and Tissue Engineering

(Also offered as MEDS 5313 and MSE 5700.) Three credits. 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 credit.

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.

6100. Neural Prostheses

Three credits.

Advanced microelectrode technologies are well-positioned to drive the next generation neuromodulation and neural prostheses for treatment of neurological diseases such as

profound hearing loss, spinal cord injury, brain-machine interfaces, and Parkinson's disease. This course discusses key technical issues related to implantable neural prostheses, in particular, 3D microelectrode arrays that interface with individual neurons directly, in various stages of development, from proof-of-concept to translation toward clinical approval. Students will also learn to critique journal articles and to write their own NIH research proposal.

6110. Computational Neuroscience

Three credits.

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. This course and ECE 6311 may not both be taken for credit.

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 system.

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 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.

6170. Nanomedicine: From Concepts to Applications

Three credits.

Teaches students competency and practical skills in applying nanotechnology to solve problems in medicine. Upon completion of the course, the students will be able to understand the basic concept of Nanomedicine and have an overview of the Nanomedicine field; understand principles and experimental methods in designing, generating, characterizing and evaluating nanotechnology-enabled therapeutics; understand how Nanomedicine is translated from scientific innovation to clinical applications; understand how Nanomedicine is applied in the cutting-edge breakthroughs of biotechnology and medicine; develop critical thinking and independent learning skills; and design a successful Nanomedicine project.

6180. Computational Foundations of Systems Biology

Three credits.

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.

6190. Bioelectrical Signals in Neuronal Tissues

Three credits. Prerequisite: MATH 1132Q, 2410Q, or instructor consent.

Neuronal tissues react to trigger signals such as electrical, mechanical, or chemical energy by generating action potentials, i.e., depolarization and repolarization of their membrane electrical potentials within $\sim 1/1000$ second. What underlies this rapid electrical event is the intricate timing of the opening and closing of ion channels, i.e., pore-forming transmembrane proteins that allow charged ions to pass through the lipid bilayer membrane. The overarching objective of this course is to help engineering students establish a top-down theoretical understanding of the nervous system, which are targets for biomedical devices like neuromodulators and stimulators to manage disease conditions. This course teaches the fundamentals of neuronal tissues by introducing the experimental observations and the integration of experimental evidence with quantitative modeling. The course is designed for BME seniors and for graduate students with a generic background in neuroscience and neurophysiology. Students are expected to demonstrate the ability to apply basic bioelectrical theories to solving relevant biomedical problems via engineering design and analysis.

6400. Biomedical Imaging

Three credits. 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 consent of the instructor.

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.

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 consent of the instructor.

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, 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. Biphase theory. Failure theories. Research paper. Topics may be modified slightly to accommodate student interests.

6701. Biomedical Materials and Implants

Three credits. Prerequisite: BME 3700 or equivalent. Open only to BME students. Not open for credit to students who have passed MSE / BME 4701 or BME 6086 when taught as Advance Biomaterials.

This advanced course will enable students to further expand their knowledge in various aspects of biomaterials science, engineering and applications. The course will focus on the strategies to improve cell-material and tissue-implant interaction. A emphasis is placed on the biomaterial innovations and technologies that integrate bioactivity, functionality to improve the performance of the implants. The course will also provide an overview of the FDA regulatory pathways for biomaterial and implant approvals.

6720. Drug Delivery

Three credits. Prerequisite: BME 3700 or equivalent; open only to BME students, others with consent. Not open for credit to students who have passed BME 3720 or BME 4985 / 6086 when taught as Drug Delivery.

Introduction to drug delivery systems that provide pharmaceutical agents at target tissues, the mechanism of pharmacokinetic regulation, the basics, technology, and applications of drug delivery systems. Emphasis on understanding the principles of pharmacokinetics and drug delivery systems to improve clinical efficacy as well as to reduce side effects.

6810. Machine Learning Methods for Biomedical Signal Analysis

Three credits. Prerequisite: Instructor consent; CSE 1010 and STAT 3025Q or equivalent. Not open for credit to students who have passed BME 4810.

Acquire the basic machine learning concepts and tools that are necessary in modern biomedical engineering to model, analyze, and classify

physiological time series. Specific focus is on multivariate data and time series extracted from multiple physiological sources, including (but not limited to) ECG, EEG, and EMG. Through a mix of lectures and hands-on laboratory experiences, the students will learn how to design and implement machine learning projects and how to use advanced statistical tools and methods to classify data, infer predictions, and validate data-driven predictive models.

Biostatistics (BIST)

5091. Biostatistics Internship

Variable (1-3) credits. May be repeated for a total of 3 credits.

Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5092. Biostatistics Practicum

One credit. May be repeated for a total of 3 credits.

Participation in two-week Biopharmaceutical Summer Academy. May be repeated for a maximum of three credits with a change of topic.

5215. Statistical Consulting

(Also offered as STAT 5215.) Three credits. Prerequisite: BIST/STAT 5315, 5505, and 5605; 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: BIST/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.

5505. Applied Statistics I

(Also offered as STAT 5505.) Three credits. Prerequisite: Open to graduate students in Statistics and Biostatistics; others with permission.

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.

5585. Mathematical Statistics I

(Also offered as STAT 5585.) Three credits. Prerequisite: Open to graduate students in Biostatistics, others with permission.

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: BIST/STAT 5505.

Analysis of variance, regression and correlation, analysis of covariance, general liner models, robust regression procedures, and regression diagnostics.

5615. Categorical Data Analysis

Three credits. Prerequisite: BIST 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

Three credits. Prerequisite: Open to graduate students in Biostatistics, others with permission.

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

Three credits. Prerequisite: Open to graduate students in Biostatistics, others with permission.

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

Three credits. Prerequisite: Open to graduate students in Biostatistics, others with permission.

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

Three credits. Prerequisite: Open to graduate students in Biostatistics, others with permission.

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.

5685. Mathematical Statistics II

(Also offered as STAT 5685.) Three credits. Prerequisite: BIST/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

Three credits. Prerequisite: BIST 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.

5815. Longitudinal Data Analysis

Three credits. Prerequisite: BIST 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.

6494. Seminar in Biostatistics

Three credits. Prerequisite: Open to graduate students in Biostatistics, others with permission. May be repeated for a total of 24 credits.

May be repeated for a total of 24 credits.

6615. Statistical Learning and Optimization

(Also offered as STAT 6615.) Three credits. Prerequisite: Instructor consent and intermediate courses in mathematical and applied statistics.

Computationally intensive statistical learning methods with optimization techniques: classification, discriminant analysis, (generalized) additive models, boosting, regression trees, regularized regression, principal components, support vector machines, and (deep) neural networks.

Business Administration (BADM)

5103. Statistics and Spreadsheet Modeling

Three credits. Prerequisite: 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. U.S. Capital Markets and Institutions

Zero credits. Prerequisite: Open to MBA students, other with consent.

Designed for students who have limited experience and knowledge of U.S. 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 to MBA students, other 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.) 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. May be repeated for a total of 6 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. May be repeated for a total of 6 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. May be repeated for a total of 6 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. May be repeated for a total of 6 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. May be repeated for a total of 6 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. May be repeated for a total of 6 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. 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; BADM 5350. 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.

5604. Predictive Modeling for Managers

Three credits. Prerequisite: BADM 5103, or BADM 5180 and 5181; open only to MBA students, others with consent.

Introduces the techniques of predictive modeling in a data-rich business environment from a managers point of view. 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.

5894. Special Topics

Variable (1-9) credits. Prerequisite: Open only to MBA students, others with consent. May be repeated for a total of 12 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Business Law (BLAW)

5175. Business, Law, and Ethics in Modern Society

Three credits. Prerequisite: Open only to MBA students, others with consent. 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 to MBA students, others with consent. Not open to students who have passed or are currently enrolled in 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.

5253. Sustainability, Markets, and Society

Three credits.

This course examines sustainability in the context of the natural and social ecosystems in which business operates. Students learn how the environmental and social impacts of business are affected by the interactions of firms with laws and legal institutions, markets, and society globally. Students gain experience assessing firm policies and practices and developing legally-astute and ethically-aware policies to achieve sustainability and to generate positive environmental and social outcomes.

5254. Managing the Future of Social Enterprise

(Also offered as BADM 5254.) Three credits. Prerequisite: Not open to students who have passed or are taking HRTS 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.

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 to

students who have passed BLAW 5182. May be repeated for a total of 12 credits.

Investigation and discussion of special topics in law.

5895. Special Topics in Business Law

Variable (1-6) credits. May be repeated for a total of 24 credits.

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.

Chemical Engineering (CHEG)

5001. Advanced Chemical Engineering Fundamentals

Three credits. Prerequisite: Instructor consent.

This course will provide graduate-level introduction to thermodynamics, transport phenomena, and kinetics within the context of chemical engineering applications. Primary attention will be paid to developing an understanding of the fundamentals of each of these topic areas. As the course progresses, integration and application of thermodynamics, transport phenomena, and reaction kinetics will be discussed.

5013. Principles of Regenerative Engineering and Applications

Three credits. Prerequisite: Instructor consent.

Foundations, principles, and technologies of regenerative engineering.

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.

5323. Surface Chemistry and Heterogeneous Catalysis

Three credits. Prerequisite: Instructor consent. Recommended preparation: CHEM 1128; Math 1132; CHEG 2103 or equivalent.

Quantum Mechanics, Physical Chemistry. Grading Basis: Graded The course will serve as an in-depth introduction to heterogeneous catalysis from a surface chemistry perspective. The course will cover topics of modern catalysis as well as the fundamental physics, chemistry, and engineering of catalysis and catalytic reactors.

5330. Applied Machine Learning in Chemical Engineering

Three credits. Prerequisite: Instructor consent.

This course is an applied machine learning algorithms course tailored for the chemical/process engineers. The focus of this course from is on case studies and real-world examples seen by chemical engineers. The course will include exposure to machine learning, data science & analytics, and big data in a chemical engineering context. Students are taught to identify descriptors, and predict and optimize system properties using a machine learning approach.

5333. Computer Simulation in Chemical Engineering

Three credits. Prerequisite: Instructor consent. Recommended preparation: CHEG 5001 or equivalent.

Learning and applying modern tools for computer simulation of chemical engineering processes. Covers the basic equations required to simulate generic types of processes and interactive Computer Labs where we solve examples from the course textbook. You will integrate theory with modeling, determine other solutions and find bugs, and identify inaccuracies or problems in the proposed solution. Short introductions to the Interface of each Software (Aspen Plus, Matlab, Comsol) will be given. The Computer Labs structure will be based on a step-by-step solution of chemical engineering problems. Will work with PowerPoint slides to perform a step for a simulation, while working with the instructor to ensure understanding before proceeding to the next slide.

5336. Optimization

Three credits.

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.

5339. Uncertainty Analysis, Robust Design, and Optimization

Three credits.

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).

5341. Fuel Processing

Three credits. Prerequisite: Instructor consent. Recommended preparation: Coursework taken from the Process Engineering Certificate.

Concepts and principles of energy and fuel resources, production and processing by applying energy and mass balances. Fundamentals of fuels processing in refinery and biorefinery processes and industrial (catalytic and non-catalytic) processes by constructing and analyzing systems level flow diagrams. Develop, solve and analyze chemical engineering systems and processes by applying fundamental concepts of thermodynamics and reaction kinetics as well as fundamental concepts from physics, biology, chemistry and mathematics. Analyze, propose solutions and present modern challenges in chemical engineering processes which involve fuel processing.

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.

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.

5376. Bioseparations

Three credits. Prerequisite: Instructor consent; enrollment in the School of Engineering.

Introduction to bioseparations, review of mass transport, adsorption, chromatography, filtration, extraction, electrophoresis, and field flow fractionation.

5393. Seminar

Zero credits. May be repeated.

5394. Seminar

Zero credits. May be repeated.

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. May be repeated for a total of 6 credits.

Independent study under the supervision of a Chemical Engineering faculty member.

Chemistry (CHEM)

5300. Independent Study

Variable (1-3) credits. May be repeated for a total of 12 credits.

5301. Microstructural and Morphological Analyses

(Also offered as IMS 5301.) Three credits.

Lecture on sample preparation and analyses for optical and electron microscopy methods including scanning electron microscopy, transmission electron microscopy, energy dispersive X-ray analysis, focused ion beam methods, and electron energy loss spectroscopy.

5302. Structural Analysis

(Also offered as IMS 5302.) Three credits.

Lecture on sample preparation and analyses for X-ray diffraction, X-ray fluorescence, X-ray imaging, Rietveld refinement, Thin Film X-ray Analyses, and In Situ methods.

5303. Compositional Analyses

(Also offered as IMS 5303.) Three credits.

Lecture on sample preparation and analyses, for characterization of compositions of materials. Methods to be discussed include titrations, atomic absorption, inductively coupled plasma mass spectrometry, infrared, Raman, Ultraviolet visible, fluorescence, chromatography, and mass spectrometry.

5304. Surface and Interfacial Analysis

(Also offered as IMS 5304.) Three credits.

Lecture on sample preparation and analyses for surfaces and interfaces, including scanning Auger microscopy, secondary ion mass spectrometry, X-ray photoelectron spectroscopy, contact angle measurements, and temperature program methods.

5310. Seminar

One credit. May be repeated for a total of 3 credits.

Reports and discussion of topics of current interest in a variety of fields of chemistry. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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.

5331. Advanced Instrumental Analysis

Three credits. Recommended preparation: A course in advanced Analytical Chemistry.

Provides graduate students with the foundations necessary to understand and apply chemical analyses and instrumental techniques.

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

Two credits.

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

Three 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 CHEM 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: 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. Extraneous probes of mechanism.

5354. Molecular Modeling

Three credits.

Current topics in molecular simulations and modeling with hands-on computational experiments: molecular mechanics and its implementation via molecular dynamics, modeling of ligand-protein interactions, free

energy calculations, molecular orbital theory, ab initio and density functional theory methods, quantum mechanics/molecular mechanics, and computational chemistry software.

5356. Statistical Mechanics

Three credits.

Equilibrium properties of macroscopic systems from a molecular point of view.

5357. Surface Science

Three credits. Prerequisite: Not open for credit to students who have passed CHEM 5393 when offered as "Surface Science."

A study of the fundamentals of surfaces, crystals, adsorbates, and surface analysis techniques. Application of general, physical, and analytical chemistry concepts in surface science.

5360. Biological Chemistry I

Three credits.

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.

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. May be repeated for a total of 12 credits.

5394. Special Topics in Polymer Chemistry

Variable (1-3) credits. 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 total of 12 credits.

5398. Variable Topics in Chemistry

Variable (1-3) credits. Prerequisite: Open to graduate students in Chemistry and related areas. May be repeated for a total of 12 credits.

Themes applicable to students in all divisions of chemistry.

5695. Special Topics in Biological Chemistry

Variable (1-3) credits. May be repeated for a total of 12 credits.

Advanced concepts and themes centered on topics in biological chemistry.

Civil Engineering (CE)

5010. Seminar in Structures and Applied Mechanics

Zero credits. May be repeated.

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. 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. 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. 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. Prerequisite: 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. Prerequisite: Not open to students who have passed ME 5521.

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.

5200. Operations Research in Civil and Environmental Engineering

Three credits. Prerequisite: May not be taken for credit after passing CE 4210.

Critical path method for scheduling and managing engineering project tasks. Resource allocation subject to constraints. Facility location problems. Simplex method for linear programming. Introduction to integer programming and network flow problems.

5210. Environmental Engineering Chemistry - I

(Also offered as ENVE 5210.) 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.

5370. Environmental Monitoring

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.

5381. Subsurface Contaminant Transport Modeling

Three credits.

Fate and transport of contaminants in groundwater. Convection, dispersion, adsorption,

and biological and radioactive decay. Field scale modeling. Galerkin finite elements. Application to field sites. Also offered as ENVE 5381.

5382. Load Rating of Bridges

Three credits. Prerequisite: Bachelors degree in Civil Engineering or relevant work experience.

Load and Resistance Factor Rating of Bridges (LRFR); National Bridge Inspection Standards; ASHTOWare; AASHTO Manual for Bridge Evaluation.

5383. Design of Bridges for Extreme Events

Three credits. Prerequisite: Bachelor's degree in civil engineering or relevant work experience.

Highway bridges; AASHTO LRFD Bridge Design Specifications; seismic design; force-based and displacement-based design methods; vessel collision, truck collision, and ice loading. Bachelor's degree in civil engineering or relevant work experience is required for this course.

5384. Accelerated Bridge Construction

Three credits. Prerequisite: Bachelor's degree in civil engineering or relevant work experience.

Common ABC methods and technologies; prefabricated bridge elements; bridge systems including Self-Propelled Modular Transporters (SPMTs) and Lateral Slide Bridge Construction; construction methods and planning.

5530. Advanced Soil Mechanics

Three credits. Prerequisite: This course and CE 4541 may not be both taken for credit.

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. Prerequisite: This course and CE 4542 may not be both taken for credit.

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.

5560. Coastal Hazard Engineering

Three credits.

Characteristics of wind hazards; characteristics of flooding and wave hazards; design of coastal

infrastructures and resilience assessment. Individual project and report.

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: Not open 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. Prerequisite: This course and CE 4720 may not both be taken for credit.

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. 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. Prerequisite: This course and CE 4730 may not both be taken for credit.

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 I

Three credits. Prerequisite: This course and CE 4740 may not both be taken for credit.

Traffic flow characteristics; traffic control devices; traffic signs and markings; traffic data collection; traffic signal timing and operation; capacity of streets, intersections, and highways; traffic impact studies; traffic simulation; term paper.

5750. Pavement Design

Three credits. Prerequisite: This course and CE 4750 may not both be taken for credit.

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. 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 II

Three credits.

Driver, pedestrian and vehicle operating characteristics; microscopic and macroscopic representations of traffic flow; microscopic and macroscopic traffic stream models; safety analysis; traffic management; shock wave analysis; queueing analysis.

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.

Classics and Ancient Mediterranean Studies (CAMS)

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 to Grad students in MCL, JUDS Medieval Studies, others with permission. May be repeated for credit.

Reading of Ancient Greek texts in the original language.

5328. Advanced Latin Composition

Three credits.

Clinical and Translational Research (CLTR)

5000. Graduate Seminar in Clinical and Translational Research

Three credits.

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

Three credits.

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.

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 (1-4) credits. May be repeated for a total of 6 credits.

A reading course for those wishing to pursue special topics in the clinical and translational research under faculty supervision.

5100. Impacts of Race on Health Equity and Medical Research and Practice

(Also offered as AFRA 5100.) Three credits. Prerequisite: Open to graduate students only.

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.

5252. Cond/Translational Clinical Community-Based Research to Improve Healthcare Policies and Practices

Three credits.

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 to M.S. students in Clinical and Translational research. May be repeated for a total 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.

Cognitive Science (COGS)

5001. Cognitive Science Proseminar

Variable (1-3) credits. 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.

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 to graduate students in PSYC, SLHS, PNB; others with consent of instructor.

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 to graduate students in PSYC, SLHS, PNB; others with consent of instructor. 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 to Graduate students in PSYC, LING, SLHS; others with consent of instructor.

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.

Communication (COMM)

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.

5004. Qualitative Research Methods in Communication

Three credits.

Introduction to methods for collecting and analyzing qualitative data. Discussion of the diverse social scientific and humanistic traditions comprising qualitative research paradigms, ethical considerations, contemporary theoretical and epistemological debates in the field, and the use of qualitative data analysis software. Applied approach to writing, theorizing, and making a difference through qualitative research.

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.

5110. Environmental Communication

Three credits.

Best practices for communicating environmental issues to diverse communities and audiences. Survey of the cognitive, affective, and behavioral theories relevant to effectively communicating about pressing environmental issues. Development of communication strategies to target different

constituencies with important environmental messages.

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 to graduate students in Communication, others with consent.

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 to graduate students in Communication and others with consent.

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.

5460. Intercultural Communication

Three credits. Prerequisite: Not open for credit to students who have passed COMM 5895 when offered as "Intercultural Communication."

Classic cross-cultural theories and new approaches in the study of cultures and cultural group interactions. Topics may include: intercultural communication history; demographic changes; ethnic identities; conflict and cooperation; violations, moral choices, professional responsibilities; acculturation, adaptation, assimilation; media use; media representation; gender and sexuality; high and low context communication; time orientation; the sojourn; and culture shock.

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.

5630. Communicating Presence

Three credits.

An examination of the conceptualization, measurement, and theoretical application of presence within a range of communication-related research disciplines.

5640. Social Media Use and Effects

Three credits. Prerequisite: Open to graduate students in Communication and 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.

5655. Human Computer Interaction

Three credits. Prerequisite: Open to graduate students, others with instructor consent. Recommended preparation: A social science or computer science course in research methods.

Evaluation of human computer interaction including issues in the design of technology people use. Methods and theories for design that consider unique needs, capabilities, and limitations of users. Techniques for evaluating user-centered systems based on the latest research.

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. Special Topics in Communication

Variable (1-3) credits. May be repeated for a total of 18 credits.

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 a total of 18 credits.

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 only.

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.

5979. Masters Capstone Project

Three credits. Prerequisite: Department consent. Recommended preparation: COMM 5001; should be taken in the last or next-to-last semester of study in the masters program.

Capstone project addressing problems or opportunities in the field of communication. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5981. Internship in Communication

Variable (1-6) credits. Prerequisite: Open to graduate students in Communication, others with consent. May be repeated for a total of 6 credits.

Completion of a departmentally-approved internship. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6001. Proseminar in Communication Research

Three credits. Prerequisite: COMM 5002, COMM 5003, and COMM 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 (3-6) credits. Prerequisite: Open to graduate students in the Communication Program. May be repeated for a total of 6 credits.

Completion and presentation of directed research projects to advance the scholarship of communication graduate students. Students taking this course will be assigned a grade of S (satisfactory) or U (unsatisfactory).

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.

Community Organization (Social Work) (CORG)

5300. Advanced Macro Practice

Three credits. Prerequisite: Corequisite: FED 5352 or Social Work Advanced Standing.

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: CORG 5300, which may be taken concurrently.

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 to MSW 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.

5310. Program Planning, Development, and Evaluation

(Also offered as POPR 5310.) Three credits. Prerequisite: Corequisite: FED 5310.

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

(Also offered as POPR 5312.) Three credits. Prerequisite: FED 5310. Corequisite: FED 5311.

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. Prerequisite: Corequisite: BASC 5301.

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 to MSW students in the Community Organization concentration. Corequisite: CORG 5370, FED 5310, and POPR 5310.

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required for students in the Community Organization concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5354. Field Education in Community Organization IV

Four credits.

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required for students in the Community Organization concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5355. Block Placement in Community Organization

Eight credits. Prerequisite: FED 5302 and 5352; open only to MSW students in the Community Organization concentration. Corequisite: POPR 5310 and FED 5350.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5370. Grassroots Organizing

Three credits. Prerequisite: CORG 5300.

An advanced methods class focused on building power and powerful organizations among marginalized individuals and oppressed communities. Students learn advanced skills in negotiation, confrontation, and broad-based campaigns to build community capacity which provide critical solutions to structural inequities. Elective course for Substantive Area: Focused Area of Study on Urban Issues in Social Work.

Comparative Literary and Cultural Studies (CLCS)

5250. Topics in Transnational Jewish History

(Also offered as HEJS 5250 and HIST 5250.) Three credits. May be repeated for a total of 6 credits.

Topics in Jewish history, both transnational in space (European, American, global) and diachronic in time (Early Modern to Late Modern). May be repeated with a change of topic to a maximum of six credits.

5301. Variable Topics

Three credits. May be repeated for a total of 9 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.

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.

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.

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.

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 9 credits.

5324. Teaching for Intercultural Citizenship and Human Rights I

(Also offered as ALDS 5324 and GERM 5324.) Three credits.

Explores the role of intercultural competence and human rights education from a variety of perspectives, including applied linguistics, education, psychology, neuroscience, philosophy, and pragmatics. Through readings, online and face-to-face discussions, role-plays, scenarios, and presentations students will critically reflect on models of intercultural competence and human rights education and their relation to (student) outcomes; examine the role of social justice and human rights within the teaching of intercultural competence; and integrate and assess intercultural competence in teaching. Taught in English.

5325. Teaching for Intercultural Citizenship and Human Rights II

(Also offered as ALDS 5325 and GERM 5325.) Three credits.

Continued exploration of the role of intercultural competence and human rights education from a variety of perspectives, including applied linguistics, education, psychology, neuroscience, philosophy and pragmatics. Students will design a research project or curricular unit for a specific

purpose in which they apply models of intercultural competence/ citizenship and human rights in practice. Taught in English.

5350. Theater and Human Rights

(Also offered as GERM 5350.) Three credits.

Exploration of theater and related performing arts as forms of artistic expression and public debate. Analysis of specific characteristics of modern and contemporary theater and exploration of theater's engagement with human rights discourse and interventions in the public sphere. Theoretical texts and recordings of performances will inform class discussions.

5355. German Jewish Literature and Human Rights

(Also offered as GERM 5355 and HEJS 5355.) Three credits.

Exploration of German Jewish Literature as a form of artistic expression and public debate. Discussion of German Jewish literary writing and its relationship with human rights discourses since the Enlightenment.

5395. Special Topics

Three credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

5398. Variable Topics

Three credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

5399. Independent Study

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

Computer Science and Engineering (CSE)

5050. Algorithms and Complexity

Three credits. Prerequisite: Open to grad students in CSE, others with consent. Recommended preparation: Discrete math; fluency in a high-level programming language; data structures, algorithms at the level of CSE 2050. Students cannot receive credit for both CSE 3500 and 5050.

Design and analysis of efficient computer algorithms. Algorithm design techniques, including divide-and-conquer, depth-first search, and greedy approaches. Worst-case and average-case analysis. Models of computation. NP-complete problems.

5095. Special Topics in Computer Science and Engineering

Three credits. Prerequisite: Open to graduate students in the CSE program, 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 to graduate students in the CSE program, others with consent. May be repeated for a total of 8 credits.

Presentation and discussion of advanced computer science problems. Students taking

this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5099. Independent Study in Computer Science and Engineering

Variable (1-6) credits. Prerequisite: Open to graduate students in the CSE program, others with consent. May be repeated for a total of 24 credits.

Individual exploration of special topics as arranged by the student with an instructor.

5102. Advanced Programming Languages

Three credits. Prerequisite: Open to graduate students in the CSE program, 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 to graduate students in the CSE program, others with consent. Recommended preparation: CSE 3504 and 4500 or the equivalent.

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.

5299. Computer Networks and Data Communication

Three credits. Prerequisite: Department consent; open to graduate students in the Computer Science and Engineering program, others with permission. Not open for credit to students who have passed CSE 3300. Recommended preparation: CSE 2304 or 3666.

Introduction to computer networks and data communications. Network types, components and topology, protocol architecture, routing algorithms, and performance. Case studies including LAN and other architectures.

5300. Advanced Computer Networks

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: CSE 3300 or the equivalent. This course and ECE 6431 may not both be taken for credit.

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 to graduate students in the CSE program, 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 to graduate students in the CSE program, 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.

5305. Operating Systems

Three credits. Prerequisite: Department consent required; open to graduate students in the Computer Science and Engineering program, others with permission. Not open for credit to students who have passed CSE 4300. Recommended preparation: CSE 3100, 2304 or 3666.

Introduction to the theory, design, and implementation of software systems to support the management of computing resources. Topics include the synchronization of concurrent processes, memory management, processor management, scheduling, device management, file systems, and protection.

5306. Advanced Operating Systems

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: CSE 4300 or the 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 to graduate students in the CSE program, others with consent. Recommended preparation: CSE 2300W, CSE 3300 and CSE 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.

5312. Architecture of Internet of Things

(Also offered as SE 5402.) Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: An undergraduate degree in electrical engineering, computer engineering, or computer science or completed a graduate level course in embedded or network systems.

This course is designed to provide students and professional engineers with a thorough understanding of the design, development, validation and evaluation of IoT systems, especially in industrial domains with stringent timing and performance requirements. The student will develop skills in specifying the requirements for the target IoT systems, selecting the appropriate hardware and software platforms, and validating and evaluating the system performance. Special emphasis will be placed on the semester-based industrial projects that will be designed from selected industrial domains to address real-life problems.

5400. Computer Security

Three credits. Prerequisite: Department consent; open to graduate students in the Computer Science and Engineering program, others with permission. Not open for credit to students who have passed CSE 4400. Recommended preparation: CSE 3400.

Computer security and the design of secure systems. Cryptographic tools. Operating system security and access control. Network, software and database security. Randomness generation. Malicious software. Anonymity and privacy. Various attacks and countermeasures. Ethical, legal and business aspects.

5402. Network Security

Three credits. Prerequisite: Open to graduate students in the Computer Science and Engineering program, others with permission; department consent required. Recommended preparation: CSE 3300 and 3400. Not open for credit to students who have passed CSE 4402.

The principle and practices of how to provide secure communication between computer systems. Includes protection techniques at the physical, network, transport layers, and major approaches in Internet security. How cryptography is applied in network security. Topics include: denial-of-service, DNS, BGP, IPSec, SSL/TLS, Authentication/Kerberos, VPNs, PKI, firewalls, intrusion detection/prevention systems, and wireless security.

5500. Algorithms

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: CSE 3500 or the 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.

5503. Theory of Computation

Three credits. Prerequisite: Department consent required; open to graduate students in the Computer Science and Engineering program, others with permission. Not open for credit to students who have passed CSE 3502. Recommended preparation: CSE 2050 and 2500.

Formal models of computation, such as finite state automata, pushdown automata, and Turing machines, and their corresponding elements in formal languages (regular, context-free, recursively enumerable). The complexity hierarchy. Church's thesis and undecidability. NP completeness. Theoretical basis of design and compiler construction.

5506. Computational Complexity

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: CSE 3502 and 3500; MATH 3160 or the 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 to graduate students in the CSE program, others with consent. Recommended preparation: CSE4300 and/or CSE4500.

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 to graduate students in the CSE program, others with consent. Recommended preparation: CSE 3500, CSE 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 to graduate students in the CSE program, others with consent. Recommended preparation: MATH 2110Q and 2210Q or the 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.

5520. Data Visualization and Communication

Three credits. Prerequisite: Only open to Computer Science and Engineering graduate students, others with permission. Recommended preparation: knowledge of algorithms, some programming experience required.

This course will focus on fundamental theory and practice of data visualization and communication. Topics to be covered include different data types, algorithms for data visualization, design of effective visualization for analysis and communication, exploratory and explanatory data analysis (for discovery of new information, detecting flaws, etc.), using data visualization to convey different messages, existing tools for data visualization, and making presentations with data. Several case studies, such as engineering, economics, or health, will be discussed.

5600. Computer Science and Engineering Research Laboratory

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. May be repeated for a total of 9 credits.

Experimental investigation of current research topics in computer science.

5602. Machine Learning for Physical Sciences and Systems

(Also offered as SE 5602.) Three credits. Prerequisite: Open to graduate students in Computer Science and Engineering, MEng in Advanced Systems Engineering, and MEng in Data Science, others with department consent. Recommended prep: Basic concepts in machine learning, linear algebra, optimization, statistics.

Foundational knowledge in applied aspects of machine learning, including methods for handling uncertain, small, and imbalanced data; feature selection and representation learning; and model selection and assessment. Students will also gain exposure to state-of-the-art research on interpretability of machine learning models, stability of machine learning algorithms, and meta-learning. Topics will be discussed in the context of recent advances in machine learning for materials, chemistry, and physics applications, with an emphasis on the unique opportunities and challenges at the intersection of machine learning and these fields.

5707. Discrete Optimization

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: CSE 3500 and MATH 2210Q.

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 to graduate students in the CSE program, 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 to graduate students in the CSE program, others with consent. Recommended preparation: CSE 3500 and MATH 2210Q.

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 to graduate students in the CSE program, 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 to graduate students in the CSE program, others with consent. Recommended preparation: CSE 4102, CSE 4701 or CSE4300.

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 to graduate students in the CSE program, 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.

5819. Introduction to Machine Learning

Three credits. Prerequisite: Department consent required; open to graduate students in the Computer Science and Engineering program, others with permission. Recommended preparation: MATH 2210Q; STAT 3025, or 3345, or 3375, or MATH 3160; CSE 3500.

An introduction to the basic tools and techniques of machine learning, including models for both supervised and unsupervised learning, related optimization techniques, and methods for model

validation. Topics include linear and logistic regression, SVM classification and regression, kernels, regularization, clustering, and on-line algorithms for regret minimization.

5820. Machine Learning

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: CSE 3500, MATH 2110Q, MATH 2210Q, and MATH 3160 or the 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.

5825. Bayesian Machine Learning

Three credits. Prerequisite: Department consent required; open to graduate students in the CSE program, others with permission. Recommended preparation: CSE3500; MATH 2110, 3160 or STAT 3345Q, or the equivalent; CSE 4820 or 5819 are also desirable but not as critical.

Bayesian machine learning is a unifying methodology for reasoning about uncertainty when modelling complex data. This course begins by covering the foundations of probabilistic modelling, Monte Carlo and variational inference algorithms, and model checking. We build on these foundations by considering essential models, e.g., mixed-membership and hierarchical models, and their applications. The course concludes with a survey of recent advances in Bayesian machine learning focusing on Bayesian nonparametrics and other advanced topics.

5830. Probabilistic Graphical Models

Three credits. Prerequisite: Department consent required; open to graduate students in the Computer Science and Engineering program, others with permission.

Probabilistic graphical models provide a flexible framework for analyzing large, complex, heterogeneous, and noisy data. They are the basis for state-of-the-art analysis methods in a wide variety of application domains, from autonomous robotics and computer vision to medical diagnosis and social networks. This course covers (a) representation, including Bayesian and Markov networks, (b) inference, both exact and approximate, and (c) estimation of both parameters and structure of graphical models.

5832. Embedded/Networked Systems Modeling Abstractions

(Also offered as SE 5832.) Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent.

Students will become 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. Use of software engineering tools (Rhapsody, Simulink, Stateflow and Simulink/MATLAB coder) in the embedded system design flows is emphasized.

5835. Machine Learning for Physical Sciences and Systems

Three credits. Prerequisite: Open to graduate students in the Computer Science and Engineering program, others with department consent. Recommended preparation: Familiarity with basic concepts in machine learning, linear algebra, optimization, and statistics (optional supplementary material will be provided for review). A background and interest in applications in the physical sciences is preferable.

Foundational knowledge in applied aspects of machine learning, including methods for handling uncertain, small, and imbalanced data; feature selection and representation learning; and model selection and assessment. Students will also gain exposure to state-of-the-art research on interpretability of machine learning models, stability of machine learning algorithms, and meta-learning. Topics will be discussed in the context of recent advances in machine learning for materials, chemistry, and physics applications, with an emphasis on the unique opportunities and challenges at the intersection of machine learning and these fields.

5837. Embedded Machine Learning

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: CSE 3500; MATH 2210Q; STAT 3025, 3345, 3375, or MATH 3160.

This course will focus on the recent advances in efficient processing of machine learning. Topics include (1) basic machine learning models (inference and training), including deep convolutional neural networks (DCNN), recurrent neural networks (LSTM, GRU, etc.), Transformer (BERT, RoBERTa, DistilBERT, etc.); (2) different applications including object recognition/detection, super resolution, neural machine translation, etc.; (3) effective machine learning accelerations including model compression, quantization, neural architecture search (NAS), GPU and FPGA implementations, dedicated hardware such as Google TPU or IBM TrueNorth; (4) emerging topics, such as federated learning for edge computing systems.

5840. String Algorithms and Applications in Bioinformatics

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent.

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. Introduction to Cyber-Security

Three credits. Prerequisite: Department consent; open to graduate students in the Computer Science and Engineering program, others with permission. Not open for credit to students who have passed CSE 3400. Recommended preparation: CSE 2500.

Introductory to the area of cyber-security. The course focuses on applied cryptography, and some of its applications and related areas in cyber security, including network and web security, usable security, privacy/anonymity, and block-chains. The course is systems-oriented; we will discuss many practical vulnerabilities, attacks and defenses. However, esp. in the beginning, we will also learn some theory - mainly, few definitions, and (fewer) proofs.

5852. Modern Cryptography: Foundations

Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: MATH 3160, CSE 3500, and CSE 3502 or the 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 to graduate students in the CSE program, others with consent. Recommended preparation: MATH 3160, CSE 3500, CSE 3502, and CSE 4702 or the 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 to graduate students in the CSE program, others with 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 to graduate students in the CSE program, 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 to graduate students in the CSE program, others with consent.

Introduction to the theory and practice of randomization and randomized algorithms as a technique for science and engineering problem solving. Topics to be 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 to graduate students in the CSE program, 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 to graduate students in the CSE program, others with consent.

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.

Dental Science (DENT)

5110. Graduate General and Oral Health Pathology

Three credits. Prerequisite: Open only to students in dental residency programs.

Builds on the foundational concepts of disease pathogenesis based on a review of specific general pathology topics.

5310. Advanced Removable Prosthodontics- Part 1

Two credits. Prerequisite: Open only to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Part 1 of the Advanced Removable Prosthodontics course will allow Prosthodontics residents to develop an in-depth knowledge of the fundamental and advanced prosthodontics concepts and knowledge of the literature as it relates to research and clinical practice. It will give evidential support to all clinical procedures performed. The course will be taught in a lecture and seminar format by graduate faculty from the prosthodontics division and will present and discuss topics in various aspects of removable prosthodontics. Residents will be assigned articles related to the topic of discussion that need to be reviewed each week prior to the scheduled seminar. Residents are required to provide written and verbal summaries and critique of each article that

is reviewed. A rigorous multiple-choice format written examination is required by all participants to successfully complete the course.

5311. Advanced Removable Prosthodontics- Part 2

Two credits. Prerequisite: Open only to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Part 2 of the Advanced Removable Prosthodontics course will build upon Part 1 of this course to allow Prosthodontics residents to develop an in-depth knowledge of the fundamental and advanced prosthodontics concepts and knowledge of the literature as it relates to research and clinical practice. It will give evidential support to all clinical procedures performed. The course will be taught in a lecture and seminar format by graduate faculty from the prosthodontics division and will present and discuss topics in various aspects of removable prosthodontics. Residents will be assigned articles related to the topic of discussion that need to be reviewed each week prior to the scheduled seminar. Residents are required to provide written and verbal summaries and critique of each article that is reviewed. A rigorous multiple-choice format written examination is required by all participants to successfully complete the course.

5312. Advanced Implant Prosthodontics

Two credits. Prerequisite: Open only to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

The Advanced Implant Prosthodontics course will allow Prosthodontics residents to develop an in-depth knowledge of the fundamental and advanced prosthodontics concepts and knowledge of the literature as it relates to implant prosthodontics. Gaining a fundamental understanding of implant prosthodontics is the core objective of this course. This course is designed to build on concepts learnt in the Advanced Removable and Fixed Prosthodontics Course. It will give evidential support to all clinical procedures performed. The course will be taught in a lecture and seminar format by graduate faculty from the prosthodontics division and will present and discuss topics in various aspects of sub-crestal prosthodontics and supra-crestal prosthodontics. Residents will be assigned articles related to the topic of discussion that need to be reviewed each week prior to the scheduled seminar. Residents are required to provide written and verbal summaries and critique of each article that is reviewed. A rigorous multiple-choice format written examination is required by all participants to successfully complete the course.

5430. Advanced Oral Histology

Two credits. Prerequisite: Open only 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: Open only 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: Open only 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: Open only 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: Open only 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: Open only 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: Open only 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: Open only 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: Open only 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: Open only 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: Open only 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: Open only 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: Open only 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.

5450. Orofacial Pain

Two credits. Prerequisite: Open only to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Odontogenic and non-odontogenic pain. Topics include the anatomy of nerve innervation in dental pulp and orofacial region, the pathophysiological mechanisms of orofacial pain, as well as differential diagnosis and clinical management of odontogenic vs. non-odontogenic pain. Emphasizes an evidence-based approach which not only allow participating residents to have an

in-depth understanding of orofacial pain but also improve clinical care for patients who suffer from orofacial pain.

5455. Scientific Writing

Two credits. Prerequisite: Open only 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: Open only 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: Open only 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: Open only to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program. May be repeated for a total 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: Open only 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: Open only to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

The second part of a 3-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 which have similar appearances.

5502. Oral and Maxillofacial Diagnostic Imaging and Interpretation Part C

Two credits. Prerequisite: Open only to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

The third and final part of a 3-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: Open only 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: Open only 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: Open only 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: Open only 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: Open only to current UConn Health Dental Residents in the combined Certificate/Master of Dental Science Program.

Full time residency for dental masters students only.

6461. Clinical Radiation Sciences: Physics and Biology I

Two credits. Prerequisite: Open only 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: Open only 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: Open only 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. Prerequisite: This is an online course only open to graduate students matriculated in the Digital Media & Design online graduate certificate or non-degree graduate students. Full-time matriculated DMD graduate students cannot enroll in this class.

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.

5001. Digital Media Graduate Colloquium

Three credits. Prerequisite: Open only to Digital Media and Design graduate students.

This course orients Digital Media and Design graduate students in their first semester to the opportunities and resources available to them within the Department, the School of Fine Arts, and the University of Connecticut.

5010. Digital Culture

Three credits.

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.

5015. MFA Studio Critique

Three credits. Prerequisite: Open only to Digital Media and Design graduate students. May be repeated for a total of 12 credits.

Directed studio research and analysis, group discussions, and related readings connecting current studio work to contemporary trends in digital media, art, and design. May be repeated for a total of 12 credits.

5020. Design Thinking

Three credits.

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 majors.

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.

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.

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 to DMD majors, others by instructor consent.

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. May be repeated for a total of 9 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.

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. May be repeated for a total of 6 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.

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. May be repeated for a total of 9 credits.

5099. Independent Study

Variable (1-6) credits. 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.

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.

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.

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.

5208. 3D Motion I

Three credits. Prerequisite: Open to DMD graduate students, others with instructor consent.

Designed to prepare graduate students for careers in motion graphics, advertising, branding, and animation fields. Courses provide students an understanding of the collaborative function of industry during the production process as well as the development of their unique style of independent filmmaking during preproduction, production, and postproduction of their project. In addition, this course allows students to create their own motion project, animation, and/or visual effects thesis. Students are encouraged to develop visual storytelling skills while using a variety of techniques, including traditional hand-drawn, stop-motion, 2D and 3D motion graphics and computer animation.

5210. Film and Video Editing I

Three credits. Prerequisite: Open to graduate students in the M.F.A Digital Media Design program.

Introduction to digital editing, project management, and working with sound and time-based storytelling. Teaches the basics of Adobe Premiere Pro, providing the tools necessary to create and deliver compelling digital video content. The course goes from the beginning of the video editing process, teaching students how to create assemblies and rough cuts, through to the end of the process, teaching the basics of sound mixing and color correction; 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.

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.

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.

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.

5235. Scientific Visualization

Three credits. Prerequisite: Open to DMD graduate students, others with instructor consent. Recommended preparation: DMD 5200.

Exploration of techniques for the development of still and animated graphics for use in science education and scientific publications and presentations. Individual and collaborative project-based coursework with involvement from scientific experts.

5240. Animating Science

Three credits. Prerequisite: Open to DMD graduate students, others with instructor consent. Recommended preparation: DMD 5200.

A project-based exploration of scientific communication through animation and animation for artistic expression inspired by science.

5250. Visual Effects

Three credits. Prerequisite: DMD 5200 and 5210; open to DMD graduate students, others with instructor consent. Recommended preparation: DMD 5230.

Exploration of compositing and visual effects through production, manipulation, and combination of live action footage with 2D and 3D animated effects.

5260. Motion Design and Animation II

Three credits. Prerequisite: Open only to DMD graduate students, others with instructor consent. Recommended preparation: DMD 5200.

Provides students with the conceptual and practical 3D tools for understanding and creating the diverse range of time-based media that have come to be known as motion graphics. Throughout the course, students will create visual effects and animated 3D graphics for television, film, web, and other types of multimedia productions using Cinema 4D, Adobe After Effects in conjunction with Illustrator, Photoshop, and Premiere Pro.

5280. Advanced Motion Media

Three credits. Prerequisite: Open to DMD graduate students, others with instructor consent. Recommended preparation: DMD 5260.

Advanced exploration of motion media topics, including large-scale, collaborative, and interdisciplinary projects, and investigations in emerging motion media technologies.

5300. Introduction to 3D Animation

Three credits.

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.

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.

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.

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.

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.

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.

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.

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.

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.

5380. Advanced 3D Research and Production

Three credits. Prerequisite: Open to DMD graduate students, others with instructor consent. Recommended preparation: Experience with working in a 3D animation application. May be repeated for a total of 9 credits.

This course explores, develops and evaluates the research and skills in 3D animation production, focusing on each student's own path of study.

5420. Wearable Electronics and Interactive Objects

(Also offered as DRAM 5420.) Three credits.

Provides a basic understanding of electronics, key components, function, construction, and project design.

5440. Mobile Application Development 1

Three credits. Prerequisite: DMD 5070; open to DMD majors, others by instructor consent.

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 to DMD majors, others by instructor consent.

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 for 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.

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.

5510. Interactive Storytelling

Variable (3-6) credits. Prerequisite: Open to DMD graduate students, others with instructor consent. May be repeated for a total of 6 credits.

With a focus on story and character development, students in this course will be challenged to generate a short narrative video game storyline. Participants will examine the relationship of story, character and player, investigate a selection of popular storytelling games, and explore ways that games have historically visualized and communicated their story. This course culminates in the development of an interactive media prototype utilizing an appropriate off-the-shelf game engine. Formerly offered as DMD 5522.

5530. 3D Virtual World and Simulations

Three credits.

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 to Graduate Digital Media and Design students, others with instructor consent.

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 to Digital Media and Design Majors, others with consent.

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 to Graduate Digital Media and Design students, others with instructor consent.

Students in this course 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 to DMD majors, others by instructor consent.

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 to DMD majors, others by instructor consent.

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.

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.

5580. 2D Game Art

Three credits. Prerequisite: Open to DMD graduate students, others with instructor consent.

Introduction to figure and perspective drawing, character and environmental concept art, pixel art, sprite animation, vector art, game UI design, texture painting, and 2D art for 3D games.

5581. 3D Game Art I - Modeling and Texturing

Three credits. Prerequisite: Open to DMD graduate students, others with instructor consent.

Basic introduction to all parts of the 3D asset creation pipeline for games including subdivision, surface, and spline modeling for game assets, UV unwrapping, PBR material painting, asset creation for game props, characters, and environments.

5582. 3D Game Art II - Motion and Technical Art

Three credits. Prerequisite: DMD 5581. Open to DMD graduate students, others with instructor consent.

Introduction to elements of motion and detailing with an emphasis on in-engine techniques including digital sculpting and retopology, rigging and animation for games, physics simulations, particle effects, custom shader design, camera animation and post-processing effects.

5610. Digital Humanities Methods

Three credits.

Digital methods in humanities research, pedagogy, and public practice drawing on current work in History, English, Classics, Media Studies, Library Science, and related disciplines.

5700. Digital Media Strategies for Business

Three credits.

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.

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.

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.

Exploration and analysis of the changes in consumer decision-making and behavior in today's digital world.

5810. Digital Cinematography I

Three credits. Prerequisite: Open to DMD graduate students, others with instructor consent.

Introduces graduate students to the fundamentals of cinematography in the digital realm, including both technical knowledge and aesthetics. Emphasis on camera angles, movements, composition, and lighting to enhance storytelling.

5820. Documentary Film Production

Three credits. Prerequisite: Open to Digital Media and Design M.A. and M.F.A. students; instructor consent required. Recommended preparation: DMD 5210 and 5810.

Introduction to camera and sound recording for small-crew documentary filmmaking. Students learn interviewing, ethics in documentary, and basic story structure. Through analysis of short and feature length documentary films, as well as hands-on directing, filming, and editing, students will learn the art and technique of documentary filmmaking.

5830. Film Writing

Three credits. Prerequisite: Instructor consent.

Introduces students to theoretical and practical work in the content and form of the fiction scenario.

5835. Narrative Short Film Production

Three credits. Prerequisite: Open to DMD graduate students, others with instructor consent.

Focuses on production of narrative short films, delineating the role of the director, from script breakdown through post-production, with emphasis on directing actors and other methodologies necessary to realize the dramatic possibilities of a cinematic story. Students create several shorts and analyze the works of master directors.

5900. M.F.A. Thesis Exhibition

Three credits. Prerequisite: Open only to Digital Media and Design graduate students in their final semester; departmental consent required.

Preparation and installation of M.F.A. thesis exhibition. Requirements include: design and

production of artworks for final exhibition, written statement, promotional material design and distribution, exhibition design, installation, documentation, and faculty review. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5998. Variable Topics

Variable (1-6) credits. May be repeated for credit.

Prerequisites and recommended preparation vary. May be repeated for credit with a change in course content.

Direct Service Elective (Social Work) (DSEL)

5310. Current Trends in Family Intervention: Evid-Based and Promising Practice Models of In-Home Treatment

Three credits. Prerequisite: Open to M.S.W. and STEP students.

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 to students in both the MSW program and the STEP 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.

Dramatic Arts (DRAM)

5000. Studies in Voice and Diction

Three credits. May be repeated for a total of 9 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. May be repeated for a total of 18 credits.

Development of breath support, vocal expressiveness, and basic diction, articulation, and phonetics skills.

5002. Voice and Diction II

Three credits.

Developing vocal range and intelligibility with text and emotional content. Continued work with consonant and vowel sounds.

5003. Voice and Diction III

Three credits.

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.

Applying diction and phonetics skills to specialized speech styles including accents and dialects.

5005. Voice and Diction V

Three credits.

Applying voice and diction skills to additional classical and contemporary dramatic forms.

5006. Voice and Diction VI

Three credits.

Exploring additional vocal skills and resources required for professional acting.

5007. Singing for Actors

One credit. May be repeated for a total of 3 credits.

Developing singing skills required for performance in musical theatre productions.

5110. Core Concepts in Arts Leadership and Cultural Management

Three credits.

An introduction to the history of the field, principles and practices of arts and cultural management, influence of other fields (sociology, political science, management, art practice) on the development and practices of arts and cultural management and theories of arts and cultural management. The students will learn and explore research methods, seminal literature, leadership models, defining events, the role of arts and cultural managers in society, professional organizations and their roles in defining the field, leading figures, and contemporary issues facing the field and its practitioners.

5111. Arts Leadership and Cultural Management Professional Internship

12 credits.

Completion of an internship, at a professional arts organization, fulfills the internship requirement of the M.F.A in Arts Leadership and Cultural Management. Faculty assists in arranging internships at professional organizations.

5112. Arts Leadership and Cultural Management Advanced Topic Research

Three credits.

Coursework consists of a single major research project, or series of smaller projects, in preparation for the student's M.F.A project. The Advanced Topic Research project, or projects, may or may not be directly related to the candidate's M.F.A Project, but must serve in some direct way to help prepare the students for the M.F.A Project.

5113. Arts Leadership and Cultural Management M.F.A Project

Six credits.

The M.F.A Project is required for all M.F.A 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 M.F.A Arts Leadership and Cultural Management program and must be approved by the graduate advisory committee. The M.F.A 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 M.F.A Project.

5114. Arts Leadership and Cultural Management Studio I

One credit.

Seminar-based course. Meets with Arts Leadership and Cultural Management Studio II, III, IV, and V. Case studies, and other forms of research, in arts administration.

5115. Arts Leadership and Cultural Management Studio II

One credit. Prerequisite: DRAM 5114.

Seminar-based course. Meets with Arts Leadership and Cultural Management Studio I, III, IV, and V. Case studies, and other forms of research, in arts administration.

5116. Arts Leadership and Cultural Management Studio III

One credit. Prerequisite: DRAM 5115.

Seminar-based course. Meets with Arts Leadership and Cultural Management Studio I, II, IV, and V. Case studies, and other forms of research, in arts administration.

5117. Arts Leadership and Cultural Management Studio IV

Three credits. Prerequisite: DRAM 5116.

Seminar-based course. Meets with Arts Leadership and Cultural Management 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 Leadership and Cultural Management 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.

5124. The Arts in Civil Society

Three credits.

Students in this course will explore the role the arts play in the wide panoply of human experience with particular focus on social justice. Themes addressed include the role of artists, arts managers, and cultural workers in civil society as well as the intersection between policy and art, activism and art, power and art, positive and negative influences of institutions on artists and public, art in the popular domain, equality and diversity of opportunity and participation. Topics are explored with both historic and contemporary lenses and from a variety of cultural perspectives. Visits to area museums and cultural institutions are a required component of the course.

5125. Law and the Arts

Three credits. Prerequisite: Open to graduate students only.

This course provides knowledge of legal reasoning concepts in contemporary law to familiarize students with the history and impact of seminal cases and court decisions on art making, exhibition, performance, transfer of ownership, artists' rights, copyright, nonprofit law, and other pertinent legal issues. The course covers local, national, and international cases of importance with emphasis on applying knowledge to an arts leadership and cultural management context.

5130. Introduction to Graduate Studies in Stage Design

Variable (1-3) credits. May be repeated for a total of 6 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.

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. May be repeated for a total of 6 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. May be repeated for a total of 9 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.

Internships in acting, costuming, lighting, management, media, puppetry, pedagogy and technical theatre.

5192. Independent Study in Theatre Studies

Variable (1-6) credits. 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. 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. May be repeated for a total of 15 credits.

Study of any topics in Stagecraft, Technical Production, or Sound not included in DRAM 5201-5213.

5201. Production Drafting

Three credits. May be repeated for a total of 6 credits.

Emphasis on preparation of plans appropriate for scenic studio bidding procedures.

5202. Technical Direction

Three credits.

A study of the planning, management and execution of all technical aspects of production.

5204. Technical Analysis

Three credits.

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. May be repeated for a total of 6 credits.

Audio recording and playback techniques used in the preparation of theatrical sound scores.

5206. Sound Technology

Three credits.

Application of signal processing devices and signal modification for specialized audio effects for production.

5207. Electricity and Electronics for the Theatre

Three credits. May be repeated for a total of 6 credits.

Study of current electrical technology and applications, including AC theory and codes.

5208. Computer Applications

Three credits.

Survey of current software available for application to production management and technical design and production.

5209. Studies in Theatre Design

Three credits.

Investigates the physical problems and codes involved in integrating theatre technology into the architectural requirements of a performance facility.

5210. Properties Construction

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 6 credits.

Fabrication of unusual stage properties and study of the application of experimental materials.

5211. Advanced Rigging Techniques

Three credits.

Technology and materials used in conventional and specialized rigging systems.

5212. Shop Technology

Three credits.

Use of materials, equipment and processes required in special fabrication techniques.

5213. Stage Technology

Three credits.

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. May be repeated for credit.

An independent project course under the direction of an appropriate faculty or staff member.

5296. MFA Project in Technical Theatre

Variable (1-6) credits. May be repeated for a total of 12 credits.

The composition and preparation of the MFA Project book/presentation for the student's MFA production in the Department of Dramatic Arts/Connecticut Repertory Theatre.

5297. Special Topics in Technical Production

Variable (1-3) credits. May be repeated for a total of 6 credits.

A reading course under the direction of an appropriate staff member.

5300. Studies in Scenic Design

Variable (1-3) credits. 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. 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.

Investigating the range of methods of solving the scenic design for plays with several locations.

5303. Scenic Design: The Musical I

Three credits.

Solutions for designing scenery for the Traditional American Musical. This topic will be looked at from both historical and contemporary points of view.

5304. Scenic Design: The Musical II

Three credits. Prerequisite: DRAM 5303.

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.

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.

Operas and Ballets from around the world will be analyzed and designed for various proscenium theatres.

5310. Scenic Design: Event Planning

Three credits. May be repeated for credit.

Examining approaches to designing special events for unique spaces.

5311. Scenic Design: Design Drafting

Three credits.

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.

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.

A study of methods of producing color sketches and renderings for the theatre, including watercolor, pastel, colored pencil, and marker as well as computer drawing techniques.

5314. Scenic Design: Model Building Techniques

Three credits.

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.

The study of how to use watercolor to create the theatrical sketch.

5316. Scenic Design: Computer Rendering for the Theatre

Three credits.

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.

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.

Students will create a dynamic portfolio for off-line presentations and then turn that portfolio into a web site.

5319. Scenic Design: Styles of Ornamentation

Three credits.

An exploration of architecture and period style from the earliest times to the present.

5320. Scene Painting

Three credits.

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. May be repeated for a total of 6 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. May be repeated for credit.

Independent study under the direction of an appropriate faculty or staff member.

5396. MFA Project in Scenic Design

Variable (3-6) credits.

The composition and preparation of the MFA Project book/presentation for the student's MFA production in the Department of Dramatic Arts/ Connecticut Repertory Theatre.

5397. Special Topics - Scenic Design

Variable (1-3) credits. May be repeated for credit.

A reading course under the direction of an appropriate staff member. May be repeated with change in topic.

5401. Costume Design: Poetic Realism

Three credits. 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.

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.

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.

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.

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.

An examination of the relationship between performance art and costume design, explored through a series of design projects.

5407. Costume Design: Film

Three credits.

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. May be repeated for credit.

Study of any topic in applied costume craft not included in DRAM 5411-5421.

5411. Color Theory / Light and Fabric

Three credits.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Provides a basic understanding of electronics, key components, function, construction, and project design.

5492. Independent Study in Costume Design

Variable (1-6) credits. May be repeated for credit.

Independent study under the direction of an appropriate faculty or staff member.

5494. Costume Design Seminar

Three credits. May be repeated for a total of 21 credits.

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. May be repeated for a total of 6 credits.

The composition and preparation of the MFA Project book/presentation for the student's MFA production in the Department of Dramatic Arts/ Connecticut Repertory Theatre.

5497. Special Topics in Costume Design

Variable (1-3) credits. May be repeated for a total of 6 credits.

A reading course under the direction of an appropriate staff member.

5500. Studies in Lighting Design

Variable (1-3) credits. May be repeated for a total of 15 credits.

Study of any topics in lighting design not included in DRAM 5501-5514. Course may be repeated with change in topic.

5501. Lighting Design: The Single Set Play

Three credits. May be repeated for credit.

The development of lighting designs for single set dramas and musicals.

5502. Lighting Design: Opera

Three credits. May be repeated for a total of 15 credits.

The design process for operatic theatre, emphasizing concepts and visual metaphors for the lighting of opera.

5503. Lighting Design: Dance

Three credits.

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.

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.

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.

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, & cyc lighting to realize the range of designer choices.

5508. Lighting Design: From Concept to Opening Night

Three credits.

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.

Examines the process of translating verbal and literary ideas into visual ideas. Tools and strategies (scene break-down, research, concept presentation, and others) for communicating with the director and other production personnel.

5512. Lighting Technology

Three credits.

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.

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.

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.

A 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 affects 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. May be repeated for a total of 9 credits.

Study of any topics in visual Digital Media not included in DRAM 5531-5535. Course may be repeated with a change in topic.

5531. Digital Design for Projections I

Three credits.

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.

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.

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.

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.

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. May be repeated for credit.

Independent study under the direction of an appropriate faculty or staff member.

5596. MFA Project in Lighting Design

Variable (3-6) credits. May be repeated for credit.

The composition and preparation of the MFA Project book/presentation for the student's MFA production in the Department of Dramatic Arts/Connecticut Repertory Theatre.

5597. Special Topics in Lighting Design

Variable (1-3) credits. May be repeated for credit.

A reading course under the direction of an appropriate staff member. May be repeated with change in topic.

5600. Studies in Puppet Arts

Variable (1-3) credits. May be repeated for a total of 9 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. 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. 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. May be repeated for 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.

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.

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.

Puppet Character design using a full range of fabrication techniques (including sculpting, molding, cast-ing, painting, and carving) to design and fully realize a puppet character.

5608. Marionette Performance

Three credits.

Exploration and skill development with the pendular attributes of a string puppet using several different performance figures.

5609. Marionette Construction

Three credits.

Design, construction and performance of a full figure string puppet.

5610. Advanced Hand Puppet Theatre

Three credits.

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.

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.

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.

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.

Dramaturgical, directorial and design research and study related to current department productions using Puppetry.

5615. Puppet Arts Aesthetics

Three credits.

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.

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.

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. May be repeated for a total of 6 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.

5621. Plays and Dramaturgy for Puppet Theatre

Three credits.

An examination of the dramatic repertoire of plays written or devised for puppets, puppet dramaturgy, and adapting and writing plays for puppets. This course considers translation from page to stage, develops skills in textual analysis, and considers playtexts as models for composing new plays for puppets.

5692. Independent Study in Puppet Arts

Variable (1-3) credits. May be repeated for a total of 9 credits.

Independent study under the direction of an appropriate faculty member.

5696. M.F.A Project in Puppetry

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 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. May be repeated for a total of 6 credits.

A reading course under the direction of an appropriate staff member.

5700. Studies in Professional Acting

Variable (1-3) credits. May be repeated for a total of 9 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. 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. 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. 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.

Working with techniques and styles for performing comedy; both in scripted plays and other performance modes.

5705. Professional Acting V

Three credits.

Additional work in analyzing and performing contemporary scripts written for both stage and screen.

5706. Professional Acting VI

Three credits.

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. May be repeated for a total of 18 credits.

Performance study and practice in selected areas of dramatic arts.

5759. Practicum in Performance

Variable (1-3) credits. May be repeated for a total of 6 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. May be repeated for a total of 9 credits.

Independent study under the direction of an appropriate faculty member.

5796. MFA Project in Performance

Variable (3-6) credits. May be repeated for a total of 6 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. May be repeated for a total of 9 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 Tai Chi. May be repeated with changes in topic.

5801. Movement for the Actor I

Three credits. May be repeated for a total of 12 credits.

Exploration of the actor's physical instrument.

5802. Movement for the Actor II

Three credits. May be repeated for a total of 12 credits.

Physical conditioning and techniques of characterization.

5803. Movement for the Actor III

Three credits.

Exploration of theatrical styles in the dramatic space, including work in the Commedia form.

5804. Movement for the Actor IV

Three credits.

Physical expression for the actor through expressive mask work and physical storytelling.

5805. Movement for the Actor V

Three credits.

Developing styles of comedic physical movement, including the art of clowning.

5806. Movement for the Actor VI

Three credits.

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.

Body alignment, release, and constructive rest techniques developed by F. M. Alexander are applied to actors' posture, movement, and breathing.

Earth Sciences (ERTH)

5000. Geoscience Core Course

Three credits. May be repeated for a total of 6 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. Formerly offered as GSCI 5000.

5050. Special Problems in Geology

Variable (1-6) credits. May be repeated for credit.

Advanced study and research in geology. Formerly offered as GSCI 5050.

5110. Sedimentology and Stratigraphy

Three credits.

Principles of sedimentology and stratigraphy. Physical processes of sediment transport and deposition. Characteristics of sediments and sedimentary rocks. Facies models for terrigenous clastic, chemical, and biochemical sediments. Stratigraphic frameworks and methodologies. One or more weekend field trips may be required. Formerly offered as GSCI 5110.

5130. Geomicrobiology

Three credits. Prerequisite: Not open to students who have passed EARTH/MARN 4130.

Microbial diversity and biogeochemistry in aquatic ecosystems, microbe-mineral interactions, fossil record, atmospheric record, microbialites, and research methodology in geomicrobiology. A weekend field trip may be required.

5140. Sedimentary Basin Analysis

Three credits. Prerequisite: Not open for credit to students who have passed EARTH 4140.

Tectonic and environmental controls on the development and evolution of sedimentary basins. Emphasis on mechanisms of formation, characteristic depositional patterns, and sediment composition in modern and ancient tectonic settings. Basin analysis methods include sedimentology, stratigraphy, geochemistry, provenance and paleocurrent analysis, subsidence modeling, and interpretation of geophysical data. Formerly offered as GSCI 5140.

5150. Applied Data Analysis in Earth Sciences

Three credits. Recommended preparation: STAT 1000Q or 1100Q, GEOG 3500Q. Not open for credit to students who have passed GEOG 4150 or EARTH 4150.

Multivariate spatial analysis methods and statistical inference in earth science, emphasizing how to translate conceptual understanding into computer code. Formerly offered as GSCI 5150.

5160. Carbonate Platforms and Reefs

Three credits. Recommended preparation: Undergraduate coursework or research in sedimentology/stratigraphy or related fields.

Carbonate platforms and reefs. Physical, chemical, and biological controls on the nature of carbonate depositional environments and their distribution in time and space. Characteristics and classification of carbonate sediments, limestones, and dolostones. Petrographic and geochemical techniques. Facies models for depositional systems. Stratigraphic frameworks and methodologies. One or more weekend field trips may be required.

5210. Glacial Processes and Materials

Three credits. Recommended preparation: EARTH 3020. Not open for credit to students who have passed EARTH 4210.

The climates and dynamics of glaciers, the geologic processes responsible for the materials and landforms of glaciated regions, and the applications of glacial geology to paleoclimatology, paleoecology, land use history, hydrology, engineering, and natural resources. Includes two weekend days of field trips to be scheduled, and tutorial meetings. Formerly offered as GSCI 5210.

5230. Advanced GIS for Remote Sensing for Geoscience Applications

(Also offered as GEOG 5230.) Three credits. Prerequisite: Not open to students who took EARTH 4230.

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. Formerly offered as GSCI 5230.

5240. Watersheds and Environmental Change

Three credits. Prerequisite: Instructor consent. Recommended preparation: EARTH 3020 or equivalent. Not open for credit to students who have passed EARTH 4240.

Research methods and advanced theory for studying watershed processes, lake systems, late Pleistocene to present environmental change, the environmental impacts of dams, and the application of sediment coring. Includes field trips to lakes and reservoirs in eastern Connecticut. Formerly offered as GSCI 5240.

5310. Advanced Structural Geology

Three credits.

Application of finite and incremental strain analyses using advanced geometric techniques. This course integrates field studies of deformed rocks with theoretical understanding and quantitative analysis. Formerly offered as GSCI 5310.

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. Formerly offered as GSCI 5320.

5330. Active Tectonics

Three credits. Prerequisite: Not open for credit to students who have passed EARTH 4330.

Tectonic processes that shape the Earth's surface, particularly its landforms. Emphasis on short-term processes that produce disasters and catastrophes and affect human society. Formerly offered as GSCI 5330.

5430. Stable Isotope Biogeochemistry

Three credits. Prerequisite: Not open for credit to students who have passed EARTH 4430.

Fundamentals of stable isotope biogeochemistry. Origin of elements and stable isotopes; equilibrium and kinetic fractionation; isotope systematics of carbon, nitrogen, hydrogen, oxygen, and sulfur; biogeochemical systems; isotopes as a forensic tracer; and isotopes in paleoclimate and paleoenvironmental research. Formerly offered as GSCI 5430.

5440. Dates and Rates in Earth and Environmental Science

Three credits. Prerequisite: Not open for credit to students who have passed EARTH 4440.

Introduction to the principles, materials, and diverse applications of commonly used geochronologic methods in geologic, environmental, archeological, and planetary studies. Topics may include the timing and tempo of planetary formation, Earth processes, natural hazards, formation of natural resources, biotic evolution, and environmental change. Formerly offered as GSCI 5440.

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. Formerly offered as GSCI 5510.

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. Formerly offered as GSCI 5520.

5530. Applied and Environmental Geophysics

Three credits.

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. Formerly offered as GSCI 5530.

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. Formerly offered as GSCI 5550.

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. Formerly offered as GSCI 5560.

5710. Advanced Hydrogeology

Three credits.

Transport processes in groundwater systems. Mathematical methods in groundwater hydrology. Water quality and resource evaluation. Formerly offered as GSCI 5710.

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. Formerly offered as GSCI 5720.

5740. Energy Resources: Past, Present, and Future

Three credits. Prerequisite: Not open for credit to students who have passed EARTH 4740.

Overview of energy resources (fossil fuel and renewable), underground fluid storage, and greenhouse gas sequestration. Subsurface geoscientific exploration and extraction methods.

5790. Field Methods in Hydrogeology

Variable (1-6) credits. May be repeated for a total of 6 credits.

Field methods associated with ground water and contamination assessments. Formerly offered as GSCI 5790.

5810. Modeling the Changing Atmosphere and Ocean

Three credits. Prerequisite: Not open for credit to students who have passed EARTH 4810.

Modeling past and future climate, with an emphasis on conceptual understanding of the earth system and simulation results from climate models

of different complexities. Formerly offered as GSCI 5810.

5850. Paleoclimatology

Three credits. Prerequisite: Not open to students who have passed EARTH 4850.

Introduction to the geological evidence, research methods, and hypotheses associated with major climatic events in Earth's history through a combination of lectures, paper discussions, and a climate modeling project. Formerly offered as GSCI 5850.

5900. Environmental Geochemistry

Three credits. Prerequisite: Not open for credit to students who have passed EARTH 4720.

Introduction to geochemistry of terrestrial and aqueous environmental systems. Chemical weathering and water-rock interactions; geochemistry of natural waters; chemical systems of the geosphere, biosphere and atmosphere; and geochemistry and climate. Formerly offered as GSCI 5900.

6000. Seminar in Earth Sciences

Variable (1-3) credits. Prerequisite: Instructor consent. Recommended preparation: Bachelors degree in Earth Sciences or related field. May be repeated for a total of 6 credits.

Weekly meetings focused on recent advances in Earth Sciences, including departmental seminars and/or discussions of scientific literature. May be repeated for a total of six credits.

6130. Seminar in Paleontology

Variable (1-6) credits. May be repeated for a total of 6 credits.

Readings and discussions on recent advances in paleontology and paleobiology. Formerly offered as GSCI 6130.

6340. Seminar in Tectonics

Three credits.

Readings and discussions of recent advances in tectonics. Formerly offered as GSCI 6340.

6430. Seminar in Geochemistry

Variable (1-3) credits. May be repeated for a total of 6 credits.

Readings and discussions of recent advances in low temperature and stable isotope geochemistry.

6520. Advanced Seismology

Three credits. Prerequisite: MATH 5410 and 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. Formerly offered as GSCI 6520.

6530. Geophysical Inverse Theory

Three credits.

Fitting geophysical model parameters to data. Topics include model uniqueness, resolution, and error estimation. Formerly offered as GSCI 6530.

6540. Seminar in Geophysics

Variable (1-6) credits.

Readings and discussions of recent advances in geophysics. Formerly offered as GSCI 6540.

6550. Special Topics in Geophysics

Variable (1-6) credits. May be repeated for a total of 24 credits.

Formerly offered as GSCI 6550.

Ecology and Evolutionary Biology (EEB)

5050. Fundamentals of Ecological Modeling

Four credits. 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 consent.

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 to graduate students in EEB, others with consent. May be repeated for a total of 6 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5200. Biology of Fishes

Four credits.

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.

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.

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.

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 to graduate students in biological sciences and related fields; others with permission.

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 to graduate students in EEB, 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.

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

Four credits. Recommended preparation: EEB 2245 or equivalent, MCB 2400 or MCB 2410 or equivalent.

Provides a theoretical background for studies in evolution. Emphasis on understanding the conceptual foundations of the field and on the application of these concepts to an understanding of the roles of mutation and evolution of populations.

5349. Phylogenetics

Four credits. Prerequisite: EEB 5347 or instructor consent.

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.

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. Physiological Ecology of Plants

Three credits. Prerequisite: Not open to students who have passed EEB 3360.

The complex relationships between plants and their environment, with a focus on the unique physiological processes of plants that underlie their ecology. The impact of human-driven global change is a cross-cutting theme.

5369. Current Topics in Biodiversity

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature on biodiversity. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5370. Current Topics in Conservation Biology

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature on conservation. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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.

5480. Science Communication I: Speaking to Public Audiences

Three credits. Prerequisite: Instructor consent required. Intended for graduate students in a STEM field or advanced undergraduates with experience in STEM research or journalism.

Readings from the primary literature on factors influencing the success of science communications, analysis of video examples of science communicators, and discussion of the relationship of scientists to the press, public and specialized audiences. Class exercises include video-recording mock interviews, working directly with journalists, writing social media posts, and exchanging constructive feedback with peers on speaking and interview skills.

5482. Science Communication II: Writing for Public Audiences

Three credits. Prerequisite: Instructor consent required. Intended for graduate students in a STEM field or advanced undergraduates with experience in STEM research or journalism.

Readings from the primary literature on factors influencing the success of science communications, analysis of science writings for public and specialized audiences, and discussion of the relationship of scientists to the public and specialized audiences. Class exercises include writing about science in a variety of styles accessible to non-scientists, including social media posts, developing graphical data illustrations, and exchanging constructive feedback with peers on writing skills.

5500. Introduction to Natural History Collections

One credit. Prerequisite: Open to graduate students in EEB, others with instructor consent.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5813. Evolutionary Ecology

Three credits. Prerequisite: Open only to graduate students in biological sciences and related fields, others with consent.

Unifies ecological and evolutionary thinking about shared core ideas, including foundational concepts such as fitness, optimality, coexistence, speciation, dispersal, community assembly, and spatial and temporal scales. Discussions and lectures will explore each concept from ecological and evolutionary viewpoints and then seek to reconcile differences and find novel intersections. Format includes student-led discussions, modeling exercises, and both independent and group projects.

5872. Environmental Risk Assessment

Three credits. Prerequisite: Open to students in the Team-TERRA program; others with consent.

An overview of understanding risks to ecosystems and ecosystem services across landscape scales, including how to predict and manage risks to food, energy, water, and ecosystems in the face of global change. Topics include working with stakeholders, identifying risks and objectives, quantifying risks, creating alternative mitigation strategies, and communicating them with stakeholders and the public.

5881. Internship in Ecology, Conservation, or Evolutionary Biology

Zero credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5882. Environmental Risk Practicum

Three credits. Prerequisite: EEB 5872; others with consent.

Provides an opportunity for students to work together in diverse, interdisciplinary teams to conduct risk assessments for local partners. Student teams apply skills in stakeholder engagement and risk analysis, management, and communication from the Environmental Risk Assessment course to solve real-life problems through a service-learning component. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5889. Research

Variable (1-6) credits. 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. May be repeated for a total of 24 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5894. Seminar

Variable (1-3) credits. May be repeated for a total of 24 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5895. Investigation of Special Topics

Variable (1-6) credits. May be repeated for credit.

Advanced study in a field within Ecology and Evolutionary Biology.

5899. Independent Study

Variable (1-3) credits. May be repeated for a total of 6 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.

6480. Seminar in Vertebrate Biology

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature in vertebrate biology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6481. Seminar in Biodiversity

One credit. May be repeated for a total of 24 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6482. Seminar in Spatial Ecology

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature in spatial ecology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6483. Seminar in Marine Biology

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature in marine biology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6484. Seminar in Plant Ecology

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature in plant ecology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6485. Seminar in Comparative Biology

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature in evolution and comparative ecology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6486. Seminar in Systematics

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature in systematic biology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6487. Seminar in Parasitology

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature in parasitology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6490. Seminar in Behavioral Ecology

One credit. May be repeated for a total of 24 credits.

Analysis and discussion of current literature in behavioral ecology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Economics (ECON)

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 and POLS 5390.)
Three credits.

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. Prerequisite: 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. Prerequisite: Not open 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.

Introduction to the mathematics of finance. Theoretical reasoning (proofs), modeling, useful simplifying approximations, and computing. Students will write basic programs in R.

5317. Machine Learning for Economists

Three credits. Prerequisite: Open to students in the Master of Science in Quantitative Economics program; others by consent.

Machine learning techniques and causal inference. Applications to economic data.

5318. Panel Data Econometrics

Three credits. Prerequisite: ECON 5312; open to students in the Master of Science in Quantitative Economics, others by instructor consent.

Standard panel-data models, which apply to datasets that follow cross-sections of individuals through time. Emphasis on determining when causal relationships can be inferred from panel data.

5321. Programming and Computation with R for Economists

Three credits. Prerequisite: Open to students in the Master of Science in Quantitative Economics program; others by consent.

Basics of R programming. Objects, data structures, logical design, functions. Applications to matrix algebra, optimization, data visualization, and econometric analysis.

5322. Open Source Programming with Python for Economists

Three credits. Prerequisite: Open to students in the Master of Science in Quantitative Economics program; others by consent.

Introduction to Python. Code structure; control flow; data input/output in various formats; testing and debugging.

5323. Convex Optimization with Python

Three credits. Prerequisite: Open to students in the Master of Science in Quantitative Economics; others by consent. Not open for credit to students who have passed ECON 4323.

Methods of convex optimization, including linear, quadratic, and general constrained and unconstrained problems. Applications, using Python, in economics and finance.

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. May be repeated for a total of 9 credits.

5499. Independent Study in Economics

Variable (1-3) credits. May be repeated for a total of 12 credits.

5500. Writing in Economics

One credit.

Techniques for, and practice in, research, writing, citation, and data presentation in economics.

Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5501. Writing and Communication for Economics and Business I

Two credits. Prerequisite: Open to students in the Master of Science in Quantitative Economics program; others by consent.

Practice in written and oral communication of economic ideas. Development of skills and techniques for success in business and professional environments.

5502. Writing and Communication for Economics and Business II

One credit. Prerequisite: ECON 5501.

Application of skills from ECON 5501 to writing and presenting a research paper developed in a third-semester Master of Science in Quantitative Economics course.

5612. Spatial Econometrics

(Also offered as GEOG 5612.) Three credits. Prerequisite: GEOG 3500Q or equivalent; or instructor consent.

Concepts, theories, methods, techniques, and programming for spatial econometrics. An introduction to estimating and interpreting econometric models for analysis of socioeconomic relationships and human-environment interactions.

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 total of 9 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 6212.

6412. Advanced Macroeconomics II

Three credits. Prerequisite: ECON 6411.

Advanced treatment of material covered in ECON 6202 and 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 Theory

Three credits.

Advanced treatment of the behavior and performance of firms in imperfectly competitive markets. Topics may include product differentiation, entry deterrence, advertising, industrial R&D, and mergers.

6462. Empirical Industrial Organization

Three credits.

Advanced treatment of the behavior and performance of firms in imperfectly competitive markets. Topics include empirical estimation of demand and production functions; static models of competition in prices and quantities; empirical models of market entry and exit; single-agent dynamic models; and dynamic games.

6463. Economics of Organization

Three credits.

Advanced treatment of material covered in ECON 5463.

6466. Environmental Economics

(Also offered as ARE 6466.) 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).

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.

6492. Teaching Economics

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 9 credits.

Acquisition, development and practice of teaching skills for effective instruction in Economics. Intended for Economics Ph.D. students in the first semester in which they are assigned as an Instructor of Record at UConn as well as for Ph.D. students in at least their second year who would like to improve their Economics teaching skills while teaching a course at UConn or at another institution. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6494. Graduate Seminar

One credit. May be repeated for a total of 8 credits.

Participation in departmental research seminars and presentation and discussion of original research projects. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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 to students enrolled in the M.A. in Music Education program and others with permission.

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 to students enrolled in the M.A. in Music Education program and others with permission.

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.

5042. Diversity, Culture, and Music Education

Three credits. Prerequisite: Open to students enrolled in the M.A. in Curriculum and Instruction, Music Education concentration, or with instructor approval; IBM students may take this course under special circumstances with advisor approval.

This discussion-oriented seminar draws upon areas of diversity, equity, and access in music education. Focuses on curricula materials, including repertoire that is culturally responsive, represents different people's and identities, and musical practices.

5043. Exceptionalities in Music Education

Three credits. Prerequisite: Open to students in the M.A. in Curriculum and Instruction, Music Education concentration, or with instructor approval. Not open to IBM students in music education; does not meet requirement for Special Education or IBM provisional certifications.

Focus on achieving meaningful inclusion of students with disabilities. Discussion-based format utilizes curricular designs including Universal Design for Learning. Common types of disabilities are covered. This course does not meet a requirement for Special Education or provisional teaching certifications.

5044. Policies, Assessment, and Music Programs in K-12 Schools

Three credits. Prerequisite: Open to students in M.A. in Curriculum and Instruction, Music Education concentration, or with instructor approval. This course is not open to IBM students in music education.

This discussion-oriented seminar draws upon areas of diversity, equity, and access in music education. Focuses on curricula materials, including repertoire that is culturally responsive, represents different people's and identities, and musical practices.

5047. Music Across the Curriculum

Three credits. Prerequisite: Open to students enrolled in the M.A. in Music Education program and others with permission.

Strategies and theories for the integration of music experiences across the curriculum.

5050. TCPCG Seminar I: Student Teaching Seminar

Three credits. Prerequisite: Open to students in the Teaching Certification Program for College Graduates, others with consent.

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 to students in the Teaching Certification Program for College Graduates, others with consent.

Culminating seminar experience in the TCPCG program.

5060. Social and Multicultural Foundations of Education

Three credits. Prerequisite: Open to students in the Teaching Certification Program for College Graduates, others with consent.

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 to students in the Teaching Certification Program for College Graduates, others with consent.

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 to students in the Teaching Certification Program for College Graduates, others with consent.

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 to students in the Teaching Certification Program for College Graduates, others with consent.

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 to students in the Teaching Certification Program for College Graduates, others with consent. 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 to students in the Teaching Certification Program for College Graduates, others with consent.

Supervised student teaching in a subject-specific content area.

5092. Practicum

Variable (1-6) credits. May be repeated for a total of 18 credits.

The implementation and application of theory in the student's area of specialization. Open primarily to master's and Sixth-Year students. May be repeated for a maximum of 18 credits.

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 total of 6 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. May be repeated for a total of 15 credits.

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.

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 EDCI 5155.

Designing, supervising and evaluating reading programs on a school and systemwide 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.

This course examines important and timely issues around popular culture and education with a focus on film/television/music and students/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 total of 9 credits.

Professional personnel to work cooperatively on problems arising out of actual school situations. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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 total of 9 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.

5847. Human Rights and Social Justice in Education

Three credits.

Introduction to human rights and social justice, two overlapping, but non-identical frameworks for understanding and acting through educational institutions, practices, and objectives.

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 total of 9 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: EDCI 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. Educational Inequities Research Methods

Three credits. Prerequisite: Instructor consent and a previous research methods course. Recommended preparation: IRB training, background in research methods, extended professional experiences in educational settings.

Advanced study on theories and methods associated with investigating educational inequities.

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 students in Sport Management 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 a total of 24 credits.

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. May be repeated for a total 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 total 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. May be repeated for a total of 15 credits.

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. Foundations of Assessment in Higher Education and Student Affairs

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; department consent required.

An introduction to research and evaluation methods in higher education institutions, and to the practice of assessment in Student Affairs. Focus on conceptualization and design, literature reviews, and ethical considerations in assessment. Open to HESA students only.

5103. Assessment Practice in Higher Education and Student Affairs

Three credits. Prerequisite: EDLR 5102; open only to Higher Education and Student Affairs M.A. students; instructor consent required.

Implementation of assessment and evaluation designs to address problems in higher education institutions. Focus on data collection and analysis, and communicating findings for improving policy and practice. Open to HESA students only.

5105. Structured 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 intragroup and intergroup dynamics and implications for personal and educational development of students and student affairs professionals.

5107. Organization, Leadership, and Administration in Higher Education and Student Affairs

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

This course explores organization and administration in higher education and student affairs with a focus on managing institutional resources.

5108. Transformational Leadership in Higher Education

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

This course will focus on leadership theory and research within the higher education context and the role leaders have in organizational transformation. A particular emphasis will be on the role of social, political, and organizational factors that shape institutional leadership within current and future trends of higher education.

5113. College and University Environments

Three credits. Prerequisite: Open to students enrolled in the Higher Education and Student Affairs master's degree program.

Seminar designed to explore various institutional types, missions, and cultures including private liberal arts colleges, community colleges, comprehensive, research-intensive 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. College Student Development: Theory and Practice

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

This course examines a range of theories related to student learning, growth, and development during the college years. While the course explores the historical, philosophical, and theoretical foundations of student development theory related to student affairs practice, it focuses on theories from constructivist, critical, and poststructural paradigms.

5118. Seminar in Higher Education

Three credits. Prerequisite: Open to students enrolled in the Higher Education and Student Affairs master's degree program.

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. Legal Issues and Decision Making in Higher Education and Student Affairs

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

This foundational course examines key components related to the intersections of legal aspects, ethics, and decision-making within the work of higher education/student affairs professionals. This course examines several federal higher education laws and guidelines and how higher education/student affairs professionals use decision making to implement those mandates in their practice.

5122. Foundations of Higher Education and Student Affairs

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

This course provides an overview of the U.S. higher education system through the examination of its history, the field of higher education/student affairs, institutional and organizational structures, public policies, and contemporary issues facing higher education systems, institutions and professionals.

5123. Administration of Student Affairs in Higher Education

Three credits. Prerequisite: Open to students enrolled in the Higher Education and Student Affairs master's degree program.

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 to Students in Professional Higher Education Administration, others with consent.

An examination of issues which affect the new student affairs administrator. Topics vary per semester.

5126. Inclusion and Equity in Higher Education and Student Affairs

Three credits. Prerequisite: Open only to Higher Education and Student Affairs M.A. students; instructor consent required.

The purpose of this course is to expose students to critically explore issues of inclusion and equity in higher education and student affairs inclusive of the role of social and historical contexts, the roles individuals (agents) who work in colleges and universities (i.e., faculty and administrators) play in achieving or thwarting inclusion and equity, and our personal and collective responsibility in creating inclusive and equitable college environments.

5130. Teaching College Students through Transition

Three credits.

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.

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.

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.

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.

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.

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.

5343. Gender in Organizational Leadership

Three credits. Prerequisite: Instructor consent.

This course seeks to challenge collective assumptions regarding the construction of "effective" leadership in education and (other organizational context) and who is considered to be an effective leader and why. Specifically, we take a critical perspective to consider how and in what ways such concepts may be built on gendered and other intersecting social identities.

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 Venue and Event Management

Three credits.

Examines all aspects of the management of sport facilities and events, including development, planning, staffing, operations, and evaluation.

5401. Principalship and Administration of Educational Organizations

Two credits.

Introduction to concepts and skills fundamental to the principalship and successful administration of educational organizations. Provides pragmatic knowledge which will give students an understanding and appreciation of the complexity of educational organizations.

5402. Human Development for School Leaders

Two credits.

Introduction to a variety of learning theories that can form the foundation for many practices and decisions as a school leader. Beyond pedagogy and school-aged learner learning theories, the course focuses in depth on adult learning concepts, research, and theory in relation to professional and organizational learning in a school/system context. Exploration of the role of new media applications and Web 2.0 to professional learning and human resource development in education.

5403. Instructional Leadership - Systems and Structures to Support Curriculum, Instruction, and Assessment

Two credits. Prerequisite: Department consent.

Addresses instructional leadership with particular attention to how principals develop and support teachers' effective instruction and instructional accommodation for students. After forming a working definition of instructional leadership, aspiring leaders will learn about facets of curriculum and instruction that can ameliorate outcomes for students. Then they will learn about leadership activities, including data use and communication strategies, to support improvement at both the classroom and school levels.

5404. Organizational Leadership - School Culture and Family and Community Engagement

Two credits. Prerequisite: Department consent.

Essential school leadership aspects of organizational culture and parent and community engagement. Developing a positive and strong culture of achievement lays the foundation for strategic improvement and supports instructional leadership and talent management effort.

Proactively engaging parents and members of the community to support a shared vision for the school helps create the conditions for successful teaching and learning outcomes.

5405. Instructional Leadership - Creating and Sustaining Instructional Improvement

Two credits. Prerequisite: Departmental consent; acceptance into UCAPP and completion of prescribed course sequence.

This course addresses instructional leadership with particular attention to how principals create and sustain systems for instructional improvement with a strong focus on the relationship between the three elements of the instructional core to increase student learning and performance. In so doing, the course builds the competencies of instructional leaders in using various systems and structures in building educator data literacy, deepening instructional data-driven decision making, and the importance of collaborative teams and ongoing leadership coaching to promote school wide change that positively affects school culture and student achievement. Aspiring leaders are provided structured learning opportunities to reflect on the intersection between instructional and equity-oriented leadership.

5406. Talent Management: Supervision and Performance Evaluation

Two credits.

Development knowledge and skills needed to evaluate and supervise instruction in schools. Upon completion of this course, students will know and understand the elements of developmental supervision and evaluation. Students will understand the elements of an effective teacher evaluation plan and the support required to implement and maintain it. Focus on understanding the relationship between teacher evaluation, professional learning and school improvement planning at large.

5407. Contemporary Educational Policy Issues

Two credits.

Introduction to the formation and implementation of education policy. The study of education policy focuses on the processes by which society develops, implements, evaluates, and modifies the rules, both official and unofficial, by which the American education system runs.

5408. Leadership for Inclusive School Communities

Three credits. Prerequisite: Departmental consent; acceptance into UCAPP and completion of the prescribed course sequence.

Addresses leadership to support special education students and other special populations in schools. It proposes that effective leadership for all special student populations involves particular knowledge and requires a strong equity orientation.

5409. Organizational Leadership: Improving Educational Organizations

Two credits.

Essential school leadership aspects of improving schools as educational organizations.

5410. Talent Management: Professional Learning

Two credits.

Development of the knowledge and skills needed to evaluate and supervise instruction

in schools. Upon completion of this course, students will know and understand the elements of developmental supervision and evaluation. In addition, students will understand the elements of an effective teacher evaluation plan and the support required to implement and maintain it. Focus on understanding the relationship between teacher evaluation, professional learning and school improvement planning at large.

5411. Legal Aspects of Education

Two credits.

Legal issues relevant to school administrators, including mandatory attendance, curriculum, school district obligations, liability issues, student rights, teacher and other employee rights, tenure, collective bargaining, and religion in schools.

5412. Organizational Leadership: Developing Organizational and Leadership Capacity

Two credits.

Essential school leadership aspects of developing organizational capacity for strategic and sustainable improvement. Students will examine the role the principal plays in ensuring the success and achievement of all students by managing organizational systems and resources for a safe, high-performing learning environment.

5518. Introduction to Sport Based Youth Development

Four credits.

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: Instructor and major advisor consent; completion of program or concentration General Examination, or comprehensive literature reviews in area of study. May be repeated for a total of 6 credits.

Open to advanced 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. IRB and ethical considerations, and preparations for proposal defense. May include methodology/methods, pilot study, limitations, and related appendices depending on student needs. May be repeated for up to six credits.

6051. Dissertation Proposal/Prospectus Development II

Three credits.

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 to students in the Ed.D. program in Educational Leadership.

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 to students in the Ed.D. program in Educational Leadership.

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 a total of 18 credits.

The implementation and application of theory in the student's area of specialization.

6201. Strategic Applications of Adult Learning

Three credits. Prerequisite: EDLR 5201, EDLR 5202, EDLR 5203, and EDLR 5204; open to students in the Adult Learning graduate program.

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.

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 total of 6 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.

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.

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.

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.

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 to students in the Ed.D. program in Educational Leadership.

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.

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.

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.

Seminar examining the history of K-12 education reforms from the 1890s to the present day.

6464. Seminar: Leadership and Organizations

Three credits. Prerequisite: Instructor consent.

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, EPSY 5607, and EPSY 6601. May be repeated for a total of 6 credits.

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.

6468. Critical Race Theory In Higher Education

Three credits. Recommended preparation: EDLR 6467.

The purpose of this course is to provide students with an in-depth exposure to Critical Race Theory (CRT) as it pertains to higher education. Critical Race Theory is an analytical framework that provides race-based epistemological, methodological, and pedagogical approaches to the study of everyday inequalities in education.

6469. Decolonizing International and Comparative Higher Education

Three credits. Recommended preparation: EDLR 5201 and 6467.

The primary purpose of the course is to provide an overview of the main methods and approaches in international and comparative higher education using decolonizing methods as well as a broad cross-cultural understanding of Global Northern and Southern higher education systems, theories, traditions, structures, and environments.

6470. Racial Justice and Decoloniality in Higher Education Teaching

(Also offered as AFRA 6470 and LLAS 6470.) Three credits. Recommended preparation: EDLR 5201, 6467; GRAD 6000, 6001.

Theory and practice of how teaching within a higher education context can work toward racially equitable learning experiences and decoloniality of the classroom.

6471. The Faculty Career

Three credits.

Explore aspects of the faculty profession in higher education.

Educational Psychology (EPSY)

5092. Practicum

Variable (1-6) credits. May be repeated for a total of 21 credits.

The implementation and application of theory in the student's area of specialization.

5094. Capstone in Secondary Transition

Three credits.

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 total of 6 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 total of 6 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 total of 6 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 to students admitted to UCAPP.

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.

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.

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.

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.

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 MA students in Communication Disorders.

100 clock hours of practicum in assessment, treatment, and prevention of communication disorders in children Pre-K-Grade 12.

5194. Seminar

Three credits. May be repeated for a total of 21 credits.

Analysis of the issues and research in the field of education.

5195. Workshop in Education

Variable (1-3) credits. May be repeated for a total of 15 credits.

Professional personnel to work cooperatively on problems arising out of actual school situations.

5198. Curriculum Laboratory

Variable (1-6) credits. May be repeated for a total of 15 credits.

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. May be repeated for a total of 18 credits.

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.

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 to members of 2 Summers MA program in Learning Technology cohort.

Applied project work integrating technology into classroom instruction.

5230. Web-Based Learning

Three credits. Prerequisite: EPSY 5240, 5510, 5220, 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 5220 and EPSY 5510.

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 to members of 2 Summers MA program in Learning Technology cohort.

E-Portfolio preparation, technology-based professional development design, and program completion artifacts.

5266. Instructional Media and Game Design

Three credits.

Introduces students to narrative - the means by which humans share and contextualize information - within the context of instructional game design, the application of game mechanics and design processes in traditionally non-game contexts (sometimes called "gamification"). Through a deconstruction of media and storytelling, we will discuss how to optimally develop engaging, informative, and cooperative educational environments.

5301. Group Processes in Counseling

Three credits.

Experiential and theoretical introduction to group process and dynamics.

5304. School Counseling Program Development and Evaluation

Three credits. Recommended preparation: Professional orientation to school counseling.

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.

5310. Facilitating Career Development

Three credits.

Provides students with relevant skills and knowledge to assist others in planning careers and obtaining meaningful work. Follows the National Career Development Association's Career Services Provider (CSP) certification process. This 120-hour course is in a distance learning format. Students who successfully complete the course requirements may apply for the Global Career Development Facilitator Certificate.

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.

Continuing the work begun in EPSY 5308; to strengthen and extend helping skills.

5316. Counseling Diverse Populations

Three credits. Recommended preparation: Professional orientation to school counseling.

Theories, skills and practices of counseling with culturally different persons in mental health settings.

5317. Field Work in Counseling and Personnel

Three credits. May be repeated for a total 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.

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. May be repeated for a total 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.

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.

5322. Mental Health Counseling Internship

Variable (1-3) credits. Prerequisite: Instructor consent required. Recommended Preparation: Enrollment in the LPC Certificate program. May be repeated for a total of 6 credits.

This course is designed to be taken while the student is completing their 600 hours of a Clinical Mental Health Counseling internship over the course of at least two summers. A total of six credits are required, with 100 clinical hours required for each credit hour. Students will attend seminars which provide the opportunity for supervision from faculty, case presentations and professional development. Internship seminar is designed to contextualize and apply all the knowledge that students have gained in their coursework up to this point. Students must provide evidence of liability insurance.

5323. Crisis and Trauma Counseling

Three credits. Prerequisite: EPSY 5308 and 5315; Instructor consent required. Open only to students in the LPC Certificate program.

Introduction to current practice and theory related to trauma and crisis intervention in counseling. This course will examine models of crisis intervention and treatment options for traumatic events. Students will learn how to evaluate risk and protective factors, utilize resources and implement treatment interventions. In addition this course will examine trauma treatment interventions that are effective with diverse and traditionally underrepresented populations.

5324. Professional Orientation to Mental Health Counseling

Three credits. Prerequisite: Instructor consent required. Open only to students in the LPC Certificate program.

Orientation to the field of mental health counseling. Topics include, history of mental health counseling, developing a professional identity, understanding mental health delivery systems and practices and current challenges and

issues in mental health counseling. In addition, this course will have students examine how mental health counseling and mental health services can be more equitable and accessible for all populations, specifically those from underrepresented communities.

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 to students in the Teaching Certification Program for College Graduates, others with consent.

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: EPSY 5602, which may be taken concurrently, and enrollment in the School Psychology program.

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.

Diagnosis of school problems, report writing for school purposes, and an 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.

5430. Childhood Development and Psychopathology

Three credits.

Addresses competencies related to child and adolescent mental disorders, the classification of these disorders, and the basis for diagnosis.

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.

5450. Issues of Cultural Diversity in School Psychology

Three credits. Recommended preparation: Enrolled in a graduate-level training school psychology program.

Introduction to multicultural issues in education. Examines the theoretical, empirical, and practical literature relevant to culturally and linguistically diverse students and families.

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.

5461. Professional and Ethical Issues in Behavior Analysis

Three credits. Prerequisite: Instructor consent.

The course will emphasize the identification of ethical and/or legal issues in practice and research; application of a multi-step problem solving framework through which the ethical standards, laws, and guidelines are interpreted; and determination of the best course of action to address the ethical and/or legal issues in the field of behavior analysis.

5462. Behavior Assessment

Three credits. Prerequisite: Instructor consent.

Designed to review the literature relevant to the assessment and treatment of challenging behavior. The course content is based on literature from the field of behavior analysis. Content will include an overview of and logic underlying procedures

to complete a functional behavioral assessment of challenging behavior and development of function-based treatments to decrease challenging behavior and increase adaptive behavior.

5463. Experimental Analysis of Behavior

Three credits. Prerequisite: Instructor consent.

Provides an overview of basic behavioral processes and presents information relating to human and nonhuman learning with a focus on the experimental analysis of behavior.

5464. Behavior Change Procedures

Three credits. Prerequisite: EPSY 5405 and instructor consent.

Designed to give the learner a broad overview how intervention is conceptualized and applied using the science of Applied Behavior Analysis.

5465. Performance Management

Three credits. Prerequisite: EPSY 5405 and instructor consent.

Provides students with an introduction to performance management, selecting and implementing interventions, and supervision practices.

5491. School Psychology Internship

Variable (3-6) credits. May be repeated for a total 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 total of 3 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.

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.

5625. Mental Disorders in Counseling Practice: Diagnosis and Treatment

Three credits. Prerequisite: Instructor consent required. Open only to students in the LPC Certificate program.

Designed to provide students pursuing counseling licensure (LPC) an understanding of abnormal psychological behavior in children and adults. Topics covered in the course include, diagnostic and classification systems of mental disorders, such as depressive disorders, anxiety, OCD, trauma, personality disorders, and eating disorders to highlight a few that are discussed. In addition to examining diagnostic criteria and processes, students will learn how to develop culturally appropriate treatment plans for different mental disorders.

5626. Addiction and Substance Abuse Counseling

Three credits. Prerequisite: Instructor consent required. Open only to students in the LPC Certificate program.

Provides counselors an overview of the addictive process. Theories of substance abuse and addictions counseling and application of these theories will comprise a significant part of this course. In particular, this course will instruct students on how to apply different theories to individuals from minoritized or underrepresented backgrounds in a culturally component, ethical, equitable manner. Students will develop a strong base of conceptual knowledge, practical skills concerning the etiology of addiction, and understand the purpose of assessment in addiction work. Finally, the class will also address wellness strategies for optimal service delivery and preventing clinician burnout.

5641. Research Design and Measurement for Data Science

Two credits. Prerequisite: Open to students enrolled in the M.S. Data Science program or with instructor consent. Recommended preparation: Knowledge of Introductory inferential and descriptive statistics.

Research design, ethical and measurement issues as they relate to data science. Measurement topics include: Design of surveys and survey instruments, reliability, validity and generalizability theory. Research design topics include: AB designs, clustering and the identification of internal and external validity threats. Open and reproducible science and ethical conduct of research are themes throughout the course.

5643. Text Analytics

Three credits. Prerequisite: EPSY 5641. Recommended preparation: This course requires an understanding of introductory statistics and regression at the level of EPSY 5605 and EPSY 5610 as well as some prior experience with statistical programming in a language like R or Python.

This course provides an applied introduction to text analytics with special emphasis on its application to education. Students will learn to use common toolkits in the Python ecosystem to analyze large-scale text data in order to generate insights into educational, cognitive, and social processes.

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 proposal writing process is covered, beginning with identification of potential funding sources through developing skill in writing major components and providing proposal critiques.

6194. Doctoral Seminar

Variable (1-3) credits. May be repeated for a total of 21 credits.

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.

Participant 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 total of 12 credits.

Intensive, one year supervised experience in school psychology setting totalling 1,500 or 2,000 hours of service.

6494. Doctoral Practicum

Variable (1-6) credits. May be repeated for a total of 21 credits.

The implementation and application of theory in the student's area of specialization.

6550. Situated Cognition

Three credits. Prerequisite: EPSY 5520, 5510, and 5530.

Theory, research and applications of situated cognition and situated learning.

6601. Methods and Techniques of Educational Research

Three credits. Prerequisite: EPSY 5605 or 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, EPSY 5607, and EPSY 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 for a total of 6 credits.

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.

An 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.

An 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.

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 EPSY 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.

6710. Conceptions of Human Potential

Three credits.

Focus on a broad approach to understanding potential in various manifestations related to intelligence and giftedness.

6730. Contemporary Issues in Giftedness, Creativity, and Talent Development

Three credits.

Collaborative study of contemporary issues in the field of giftedness, creativity, and talent development.

6770. Concepts in Curriculum and Instruction for Talent Development

Three credits.

Major models and strategies for curriculum and instruction in support of advanced-level learning, with focus on underlying concepts, organizational models, and approaches to research on curriculum and instruction in learning environments.

6780. Affective Issues in Achievement and Talent Development

Three credits.

Study of social and emotional issues in the development of advanced potential, with emphasis on theory and research regarding these areas of development and implications for services.

Electrical and Computer Engineering (ECE)

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.

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, H₂ and H-infinity optimal control, numerical optimization and nonlinear control.

5151. Underwater Acoustics and Sensing Systems

Three credits. Recommended preparation: Undergraduate courses in Calculus Based Physics; MATLAB or equivalent for computer simulations.

The fundamentals of ocean acoustics, including the acoustic wave equation, ray theory, acoustic arrays and filters, ambient noise, scattering, absorption, an introduction to normal mode theory, and sonar equations. Computer simulation emphasizes acoustic ray tracing and propagation loss predictions.

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 sea water 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 consent of instructor.

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. Recommended preparation: ECE 4211.

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.

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 smallsignal, 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 for 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. Prerequisite: This course and ECE 4261 may not both be taken for credit.

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.

5401. Advanced Digital Systems Design

Three credits. Recommended preparation: coursework in digital design.

Microarchitecture and design of hardware acceleration for domain-specific applications. Topics include gate-level design, register-transfer-level (RTL) design, microarchitecture, instruction set architecture, compilers, programming languages, and algorithms. Focus on both efficient software for embedded applications and the design of efficient hardware systems for such applications.

5402. Computer Architecture

Three credits. Recommended preparation: CSE 4302 or 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.

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.

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.

5550. Microgrids

Three credits. Prerequisite: ECE 3231 or instructor consent.

Advanced modeling, control, resilience and security technologies useful for the grid modernization from a unique angle of microgrid design, analysis and operation. Smart inverters, microgrid architectures, distributed energy resources modeling, microgrid hierarchical control, microgrid stability, fault management, resilient microgrids through programmable networks, reliable networked microgrids, and cyber security.

5552. Communication Systems in Smart Grids

Three credits. Prerequisite: ECE 3231.

Analysis and design of communications systems to support emerging smart power systems, including transmission and distribution grids. Topics include communication system concepts and principles, control and communication system enhancements, smart grid architecture and applications with different requirements, wide area network (WAN) and field area network (FAN) technologies and data management, smart grid security assessment with operational technologies, robust advanced metering infrastructure (AMI) applications in communication networks design.

5554. Distribution Management Systems

Three credits. Prerequisite: ECE 3231 or instructor consent.

Role of Distribution Management Systems (DMS) in smart distribution, standards and regulations, static and dynamic models, advanced DMS applications (topology processor, Volt/VAR control, fault detection, isolation, restoration, state estimation, three-phase power flow, short circuit analysis, feeder reconfiguration, optimal capacitor placement, protection coordination, maintenance and outage planning), power quality analysis, electric vehicle charging/discharging, active distribution network under high penetration of distributed energy resources (DERs), aggregation of DERs for DERMS.

6094. Seminar

One credit. May be repeated for a total of 8 credits.

Presentation and discussion of advanced electrical engineering problems. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6095. Special Topics in Electrical and Systems Engineering

Variable (1-3) credits. May be repeated for a total of 15 credits.

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. 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.

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 ECE 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 which 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 2410Q, MATH 3160 or STAT 3345, ECE 3111 and 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.

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.

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.

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, floorplanning, placement, routing, compaction, and pin assignment.

6432. VLSI Design Verification and Testing

Three credits.

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.

Engineering (ENGR)

5300. Special Topics in Engineering

Variable (1-6) credits. May be repeated for a total 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. Taught with AMES 5121.

5312. Engineering Project Planning and Management

Three credits.

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. Taught with AMES 5101.

5315. MENG Capstone

Three credits. Prerequisite: Open only to students in the Master of Engineering (MENG) program who have successfully completed at least 24 credits of coursework.

Required for students matriculated in the Master of Engineering program to complete an interdisciplinary engineering project where the subject matter/content spans more than one field of interest. The project should draw upon and demonstrate the application of material taught in the MENG program. The subject of the project selected could be one that supports the company for which the graduate student is employed or can be created in collaboration with the student's capstone faculty advisor.

5316. Independent Study

Three credits. Prerequisite: Departmental consent required. A minimum of 21 credits toward the M.Eng. degree.

Independent Study for Engineering Professional Education.

5410. Scientific Communication

One credit.

Formalize the practice and improve professional development skills related to communicating scientific data and research related topics. Topics include: developing the skill to build a story with relevant information to communicate scientific data, developing the art of public speaking and communicating scientific ideas to the research community and the general public, creating proper template for presentations, talks or posters, assessments and feedback for continuous improvement, and developing dissertation briefs. The course will also include invited talks and feedback from guest speakers in the field of communication.

5420. Engineering Internships and Careers in Industry

One credit.

Formalize the practice and improve professional development skills related to obtaining an internship in the industry/national labs. Topics include: identifying engineering internships and research fellowships, creating personal online professional brand, by developing effective resume and cover letters, developing interview skills, assessments and feedback for continuous improvement.

5430. Teaching Engineering: Communication and Pedagogy

One credit.

Formalize the practice of professional development skills related to teaching in settings typically encountered by graduate students in engineering utilizing the foundations of course design and effective communication strategies.

Topics include: education theory, teaching philosophy and diversity in the classroom, instruction design, learning objectives, motivating others to learn, assessments basics, and developing an effective instructional strategy, including methods, modules, and assessments to effectively execute instructional learning.

5510. Technology Innovation and Entrepreneurship

Three credits. Prerequisite: Open to juniors or higher in Engineering and Business and all graduate students in the School of Engineering; instructor consent required.

This course is offered in the Fall and focuses on entrepreneurship concepts and approaches such as design thinking, user-centric need and problem identification, and product market fit. The course is taught through an experiential project-based and authentic learning approach using both lectures and student participation and presentations.

English (ENGL)

5100. The Theory and Teaching of Writing

Three credits. Prerequisite: Open to graduate students in English, 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 to graduate students in English and Medieval Studies, others with consent.

Consideration of the question, "What is a research method?" and introduction to critical methods relevant to humanities-based research. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5160. Professional Development in English

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, 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: ENGL 5100, which may be taken concurrently.

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 to graduate students in English, 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 to graduate students in English and Medieval Studies, 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 to graduate students in English, 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.

5250. History of English Studies

Three credits. Prerequisite: Open only to English graduate students, others with consent.

A history of English as a professional academic discipline and department in universities from the later nineteenth century to the present day.

5310. Old English

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent.

A study of the language and literature of pre-conquest England.

5315. Medieval Literature

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent.

A study of medieval literature, exclusive of Chaucer.

5318. Chaucer

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent.

5320. Shakespeare

Three credits. Prerequisite: Open to graduate students in English, others with consent.

5323. Renaissance Drama

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent.

5325. Renaissance I: 1485-1603

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, 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 to graduate students in English and Medieval Studies, others with consent.

5329. Milton

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent.

5330. Restoration and Eighteenth-Century Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent.

5340. Romantic Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent.

Open to graduate students in English, others with permission.

5345. Studies in Victorian Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent.

5350. Modern British Writers

Three credits. Prerequisite: Open to graduate students in English, others with consent.

5360. Irish Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent.

5410. American Literature to 1776

Three credits. Prerequisite: Open to graduate students in English, others with consent.

5420. American Literature 1776-1865

Three credits. Prerequisite: Open to graduate students in English, others with consent.

5430. American Literature 1865-1914

Three credits. Prerequisite: Open to graduate students in English, others with consent.

5440. American Literature since 1914

Three credits. Prerequisite: Open to graduate students in English, others with consent.

5500. Literary Criticism

Three credits. Prerequisite: Open to graduate students in English, 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 to graduate students in English, 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 to graduate students in English, others with consent.

Classical and contemporary rhetorical theory, current research in composition.

5650. Digital Humanities

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, 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. May be repeated for a total of 24 credits.

A reading course normally open only to doctoral candidates.

6200. Seminar in Children's Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 15 credits.

Major authors, themes, or literary movements in American or British children's literature.

6270. Seminar in Modern Poetry

Three credits. Prerequisite: Open to graduate students in English, others with consent.

6290. Seminar in Non-Fiction Prose

Three credits. Prerequisite: Open to graduate students in English, others with consent.

6310. Seminar in Beowulf

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent.

6312. Seminar in Old Irish

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent. May be repeated for a total of 15 credits.

Language and literature of Medieval Ireland.

6313. Seminar in Old Norse

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent.

Old Norse language and literature.

6315. Seminar in Medieval Literature

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent. May be repeated for a total of 24 credits.

6320. Seminar in Shakespeare

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 6 credits.

6325. Seminar in Renaissance Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 6 credits.

This course may be repeated for a total of six credits with a change in content.

6330. Seminar in Eighteenth-Century Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 6 credits.

With a change in content, this course may be repeated for a total of six credits.

6340. Seminar in Romantic Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 12 credits.

6345. Seminar in Victorian Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 6 credits.

May be repeated for a total of six credits with a change in content.

6360. Seminar in Irish Studies

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 12 credits.

Major authors, movements, or themes in Irish literature.

6400. American Ethnic Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 9 credits.

With a change of content this course 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 to graduate students in English, others with consent. May be repeated for a total of 6 credits.

Introduction to a particular American literary movement.

6450. Seminar in American Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 15 credits.

With a change in content, this course may be repeated for credit.

6500. Seminar in Literary Theory

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 12 credits.

6530. Seminar in World Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 15 credits.

Major authors, movements, or themes in world literature written in English.

6540. Seminar in Literature and Human Rights

Three credits. Prerequisite: Open to graduate English students only, others with permission. May be repeated for a total of 9 credits.

The interdisciplinary study of literature and human rights discourse.

6550. Seminar in Rhetoric and Composition Theory

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 6 credits.

May be repeated for a total of six credits with a change in content.

6575. Seminar in Women and Literature

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent. May be repeated for a total of 6 credits.

May be repeated for a total of six credits with a change in content.

6600. Creative Writing Workshop

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 12 credits.

6650. Seminar in Digital Humanities

Three credits. Prerequisite: Open to graduate students in English and Medieval Studies, others with consent. May be repeated for a total of 6 credits.

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 to graduate students in English, others with consent. May be repeated for a total of 9 credits.

May be repeated for a total of nine credits with a change in content.

6750. Seminar in Language and Literature

Three credits. Prerequisite: Open to graduate students in English, others with consent. May be repeated for a total of 21 credits.

This course may be repeated with a change in content.

6800. American Studies: Methods and Major Texts

(Also offered as AMST 6000 and HIST 6000.) Three credits.

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: Keywords

(Also offered as AMST 6850 and HIST 6850.) Three credits. Prerequisite: Open to graduate students in English, History, and Political Science; open to others with consent. May be repeated for a total of 6 credits.

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. 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. 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. May be repeated.

Extended discussions on presentations contributed by staff, students and outside speakers. A certificate of completion will be issued from the Environmental Engineering Program.

5110. Brownfield Redevelopment

Three credits.

Interdisciplinary study of the process of investigating, cleaning up and putting back into use abandoned sites with suspected contamination, also known as brownfields. Legal, environmental, financial and social aspects are discussed. Service learning component working with communities on local brownfield sites.

5210. Environmental Engineering Chemistry - I

(Also offered as CE 5210.) 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

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

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.

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.

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. Environmental Site Investigations

Three credits.

Technical and Regulatory Framework for the investigation of potentially contaminated sites; basic geochemistry and hydrogeology principles; design of soil and groundwater investigations; human and ecological risk assessment; data analysis; principles of hazardous waste management at contaminated sites.

5540. Design of Groundwater Systems

Three credits. Prerequisite: Not open for credit to students who have passed ENVE 4540.

Design of groundwater engineering systems used for water supply and/or preservation/improvement of water quality. Steady and transient flow, pumping tests, well hydraulics, and well-field design. Unsaturated zone hydrology, design and evaluation of landfills. Heterogeneity in natural systems, parameter estimation and inverse methods. Application of basic geostatistics in the design of groundwater systems.

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.

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.

European Studies (ES)

5105. Independent Study in European Studies

Variable (1-6) credits. May be repeated for a total of 24 credits.

Executive MBA (EMBA)

5001. Current Business Topics

1.5 credits. Prerequisite: Open only to Executive MBA students. May be repeated for a total of 3 credits.

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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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

Variable (1-4.5) credits. Prerequisite: Open only to Executive MBA students. May be repeated for a total of 4.5 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 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 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 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 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 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 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 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 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 Executive MBA students. May be repeated for a total of 3 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 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 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.

Field Education (Social Work) (FED)

5301. Field Education Seminar I

Zero credits. Prerequisite: Corequisite: BASC 5390, 5391, and FED 5351.

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. Prerequisite: FED 5352 taken concurrently.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5310. Field Education Seminar III

Zero credits. Prerequisite: Open to students in the MSW program.

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. Prerequisite: Corequisite: ADMIN 5354 or CORG 5354 or IGFP 5354 or POPR 5354.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5340. Field Practicum Extension

Variable (1-5) credits.

Field Practicum Extension of hours. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5350. Field Education Seminar V

One credit. Prerequisite: FED 5302 and 5352; open only to MSW students. Corequisite: CORG 5355 or IGFP 5355.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5351. Field Education Foundation I

Four credits. Prerequisite: Corequisite: BASC 5390, 5391, and FED 5301.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5352. Field Education Foundation II

Four credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Finance (FNCE)

5101. Financial Management

Three credits. Prerequisite: ACCT 5121; 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 to MBA students, others with consent. Not open to students who have passed or are currently enrolled in 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. Prerequisite: 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 FNCE 5182; open 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 FNCE 5182; open 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 FNCE 5182; open 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 FNCE 5182; open 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. Prerequisite: 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.

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.

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.

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.

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.

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.

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.

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.

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.

5334. Risk Management Project

1.5 credits.

Students must complete work on projects sponsored by businesses and other organizations. Projects vary from applied research outputs to tangible products such as software.

5341. Financial Risk Management III - Advanced Topics

Three credits.

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.

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.

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

1.5 credits. Prerequisite: 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. 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.

5399. Independent Study

Variable (1-6) credits. May be repeated for credit.

5408. Valuation of Financial Assets

Three credits. Prerequisite: FNCE 5101 or FNCE 5182; open 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 FNCE 5182; open 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 to MBA students, others with consent. 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, FNCE 5202; open to MBA students, others with consent.

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 FNCE 5182; open 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 FNCE 5182; open 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 FNCE 5182; open 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 FNCE 5182; open 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 FNCE 5182; open 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 FNCE 5182; open 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 FNCE 5182; open 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 FNCE 5182; open 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 FNCE 5182; open 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.

5710. Introductions to Financial Models

Three credits. Prerequisite: Open to MS in FinTech students, others with consent. Rec prep: Students new to Finance are encouraged to complete the online Bloomberg's BML early, preferably, before taking the course, for an intro and overview of financial markets and institutions.

Quantitative introduction to time, risk, and arbitrage valuation models used in equity, credit, and derivatives markets. Covered models include discounted cash flow models, equity valuation models, asset pricing models, term structure models, binomial trees and other derivatives models. Students will be introduced to portfolio construction, technical analysis, and to programming using Python. Students new to Finance are encouraged to complete the online Bloomberg's BML very early in the course or, preferably, before taking the course, for an introduction and overview of financial markets and institutions.

5711. Foundations of FinTech

Three credits. Prerequisite: Open to MS in FinTech students, others with consent.

Overview of Fintech. It consists of three modules. Module A: Fintech's four thematic areas: Paying for goods and services, Savings and investment products, Credit and loan products, and Managing risk. Module B: Fintech's four enabling technologies: Distributed computing, AI and big data, Cryptography and Blockchain. Module C: Fintech's four perspectives: The disruptive companies, The incumbent financial institution, Societal effects and regulatory responses, and The private equity investor.

5712. FinTech Economics and Business Models

Three credits. Prerequisite: FNCE 5710 and 5711. Open to MS FinTech students, others with consent.

This course addresses the economics within the Fintech ecosystem, its various business models, and value creation with emphasis on the competitive landscape in Payments, Wealth management, Crowdfunding and Lending. Topics include contract theory and game theory.

5720. Cryptocurrencies

1.5 credits. Prerequisite: OPIM 5513. Open to MS in FinTech students, others with consent.

This course examines the BTC ecosystem, XRP, ETH, tokens and ICOs and CBCC.

5721. Blockchain Applications

Three credits. Prerequisite: FNCE 5711, 5720; and OPIM 5513. Open to MS in FinTech students, others with consent.

This course expands on PKC, data structures, Consensus algorithms, data structures - Merkle trees, Consensus Algorithms. Explores uses of blockchain as a general purpose technology.

5722. Algorithmic and High Frequency Trading

Three credits. Prerequisite: FNCE 5710. Open to MS in FinTech students, others with consent. Corequisite: OPIM 5512.

Quantitative trading models implemented on computer systems for automatic execution. Examines popular trading strategies. Emphasizes hands-on experience; students will use Python to write, back test, and refine strategies. Focus on finance machines and automatic bots as essentials part of the current trading infrastructure in the U.S. market. Exposes students to the world of high frequency trading and market making. Intent is to be less theoretical but more practical so that students will experience firsthand some of the issues that high frequency trading system operators have.

5757. FinTech Workshop

Three credits. Prerequisite: Open to MS in FinTech students, others with consent. Corequisite: FNCE 5712.

Students apply fintech skills learnt to identify a potentially disruptive venture in the financial services industry. Students will formulate a comprehensive professional business plan and proposal. Elements of valuations in the venture capital markets are discussed.

5894. Seminar

Variable (1-3) credits. Prerequisite: FNCE 5101 or FNCE 5182; open to MBA students, others with consent. May be repeated for a total 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 FNCE 5182; open to MBA students, others with 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 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 total of 12 credits.

6201. Introduction to Finance Theory and Evidence

Three credits.

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.

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.

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.

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.

6205. Advanced Corporate Finance

Three credits. Prerequisite: FNCE 6202; Open only to second year Finance PhD students.

This is the second PhD-level class in corporate finance. It builds upon FNCE 6202 and examines further developments in the area. The goal is to bring students to the frontier of the knowledge and corporate finance research, so that they can start doing their own research. We start by discussing a core issue in empirical corporate finance - endogeneity and various approaches to address it. We will then cover long-time important topics including security issuance, mergers and acquisitions, behavioral finance, and private equity. Finally, we will introduce latest and emerging areas such as textual analysis and machine learning, climate finance, and household finance. We will discuss both the theoretical and empirical aspects of these topics.

French (FREN)

5321. Old French Literature

Three credits. Prerequisite: Open to graduate students in LCL, others with instructor consent. May be repeated for a total of 12 credits.

May be repeated for up to 12 credits with change in content.

5332. The Poetry of the French Renaissance

Three credits. Prerequisite: Open to graduate students in LCL, others with instructor consent. May be repeated for a total of 12 credits.

May be repeated for up to 12 credits with change in content.

5334. The Prose of the French Renaissance

Three credits. Prerequisite: Open to graduate students in LCL, others with instructor consent. May be repeated for a total of 12 credits.

May be repeated for up to 12 credits with change in content.

5357. Topics in Eighteenth-Century Literature and Culture

Three credits. Prerequisite: Open to graduate students in LCL, others with instructor consent. May be repeated for a total of 12 credits.

May be repeated for up to 12 credits with change in content.

5361. French Poetry in the Second Half of the Nineteenth Century

Three credits.

5363. Topics in Nineteenth-Century French Literature

Three credits. Prerequisite: Open to graduate students in LCL, others with instructor consent. May be repeated for a total of 9 credits.

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 to graduate students in LCL, others with instructor consent. May be repeated for a total of 9 credits.

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.

5372. French Contemporary Poetry

Three credits. Prerequisite: Open to graduate students in LCL, others with instructor consent. May be repeated for a total of 12 credits.

May be repeated for up to 12 credits with change in content.

5373. The French Contemporary Novel

Three credits.

5374. Narrative Forms in 20th- and 21st-Century French Literature

Three credits. Prerequisite: Open to graduate students in LCL, others with instructor consent. May be repeated for a total of 9 credits.

Narrative in 20th- and 21st-century literature, including its criticism and theory, in traditional and nontraditional literary forms. May be repeated with a change of topic for up to nine credits.

5375. Aesthetic Trends in Twentieth-Century French Literature

Three credits. Prerequisite: Open to graduate students in LCL, others with instructor consent. May be repeated for a total of 12 credits.

May be repeated for up to 12 credits with change in content.

5380. Seminar in Francophone Literature

Three credits.

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.

5395. Special Topics

Variable (1-3) credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

5398. Variable Topics

Three credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in topic.

5399. Independent Study

Variable (1-3) credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

5407. Problems in French Literature or Philology

Variable (1-3) credits. Prerequisite: Open to graduate students in LCL, others with instructor consent. May be repeated for a total of 12 credits.

May be repeated for up to 12 credits with change in content.

Geography (GEOG)

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 to graduate students in Geography.

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.

5130. GIS in Transportation

Three credits. Prerequisite: Open to graduate students in Geography.

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 total of 6 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 EARTH 5230.) Three credits. Prerequisite: Not open to students who took EARTH 4230.

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. Formerly offered as GSCI 5230.

5240. Disaster Risk, Vulnerability, and Resilience

Three credits. Recommended preparation: Introductory course on natural hazards and disasters.

Overview of geographical perspectives on disaster risk, vulnerability, and resilience using an integrated environmental, social, and infrastructural approach. The theory, methods, metrics, and tools necessary to measure and understand risk, vulnerability, and the resilience of societies worldwide.

5290. Advanced Urban Geography

Three credits. May be repeated for a total of 6 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. Prerequisite: Not open 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. Classic Papers in Climate Science

Three credits. Prerequisite: May not be taken for credit by students who have passed GEOG 4300. May be repeated for a total of 6 credits.

An examination of the defining primary literature in the evolution of climate science to the present state of knowledge. Topics may include the Greenhouse Theory of Climate, El Niño, Climate Prediction, and regional processes of interest (e.g., monsoons, storm tracks, desert dynamics).

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. Applications of Geographic Information Systems

Three credits. Recommended preparation: GEOG 5500.

Operational and management issues of geographic information systems (GIS) with emphasis on understanding GIS through use of software. Topics include the principal functional components of GIS including general GIS design and management theory, spatial and attribute data creation, database design and management, spatial analysis, cartographic production, and application design and implementation. Practical work includes analytical exercises using GIS culminating in an application project.

5512. Introduction to Spatial Data Science

Three credits. Prerequisite: GEOG 5500 or instructor consent.

Introduction to the fundamentals of spatial data science. Students will also learn how to apply a high-level programming language, R, for spatial data analysis, visualization, and modeling.

5515. Web GIS

Three credits.

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.

5516. Fundamentals of Spatial Database Systems

Three credits. Prerequisite: Not open for credit to students who have passed GEOG 4516.

The theories and principles behind Spatial Database Systems. Students will learn how to design and implement spatial databases.

5518. Mobile GIS

Three credits. Prerequisite: Not open for credit to students who have passed GEOG 4518.

This course covers how to develop, test, and publish mobile GIS web and native apps across multiple mobile platforms (Android, iOS, etc.).

5519. Spatial Big Data Analytics

Three credits. Prerequisite: Instructor consent required. Not open for credit to students who have passed GEOG 4519.

Covers the collection, analysis, and visualization of spatial big data to support better decision-making in geographic contexts.

5520. GIS Modeling of the Urban Environment

Three credits.

Survey of GIS methods and spatial analysis for studying spatial patterns of land use and human activity in an urban environment.

5530. GIS for Health and Environment

Three credits. Recommended preparation: GEOG 5500.

An exploration of how spatial data and Geographic Information Systems (GIS) can be used to understand and improve human and environmental health.

5540. Social Dimensions of Renewable Energy

Three credits. Prerequisite: GEOG 5500 or consent of instructor.

Geographic concepts and methodological tools guiding decision-making between potential energy futures. Spatial patterns of economic and social activity in the transition to low carbon energy.

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.

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.

5612. Spatial Econometrics

(Also offered as ECON 5612.) Three credits. Prerequisite: GEOG 3500Q or equivalent; or instructor consent.

Concepts, theories, methods, techniques, and programming for spatial econometrics. An introduction to estimating and interpreting econometric models for analysis of socioeconomic relationships and human-environment interactions.

5620. Computer Applications in Spatial Analysis

Three credits.

Advanced seminar in the design of Geographic Information Systems software for solving problems in spatial analysis.

5810. Special Problems in Geography

Variable (1-6) credits. May be repeated for a total of 18 credits.

5890. Internship in Geography

Variable (1-6) credits. May be repeated for a total 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 to graduate students in Geography. May be repeated for a total of 3 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6810. Seminar on Spatial Analysis of Social Issues

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 6 credits.

An exploration of the complex social processes connecting people, places, and the environment across space using quantitative and qualitative methods of spatial analysis. Topics may include sustainability, environmental justice, racial and gender disparities, transportation, health issues, and the dynamics of internal and international migration with a unifying theme to understand the interaction between social processes and spatial inequalities. May be repeated for a maximum of six credits.

6815. Seminar on Geographic Information Science and Systems

Three credits. Recommended preparation: GEOG 5500 or 5510. May be repeated for a total of 6 credits.

An exploration of Geographic Information Science (GISc) and Systems (GIS) theories, methods, and critiques for physical and social sciences. Topics may range from fundamental to emergent themes including measurement biases, uncertainties, qualitative GIS, spatial big data, human dynamics, and GeoAI. May be repeated for a total of six credits.

6840. Advanced Topics in Urban Geography

Three credits. May be repeated for a total of 6 credits.

6870. Seminar on Earth System Science

Three credits. May be repeated for a total of 6 credits.

This seminar highlights one or more aspects of UConn Geography's Earth System Science group's expertise in understanding interactions within and between the atmosphere, hydrosphere, geosphere, and biosphere. Topics may include climate modeling, paleoclimate analysis, and geomorphology with the purpose of understanding the Earth's climate system and/or the mechanics and evolution of mountains and landscapes around the world.

6875. Seminar on Human-Environment Dynamics

Three credits. May be repeated for a total of 6 credits.

An exploration of transdisciplinary and multidisciplinary approaches in human-environment systems (HES) science to help solve complex human-environmental problems. Topics may include an understanding of challenges, methodologies, and potential solutions to human-environmental problems such as global environmental change, related critical physical, chemical, and biological systems, natural hazards and disasters, risk, resilience, and climate extremes from geographic perspectives.

German (GERM)

5305. Studies in Germanic Philology and Linguistics

Three credits. May be repeated for a total 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 total 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 total of 4 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.

5324. Teaching for Intercultural Citizenship and Human Rights I

(Also offered as ALDS 5324 and CLCS 5324.) Three credits.

Explores the role of intercultural competence and human rights education from a variety of perspectives, including applied linguistics, education, psychology, neuroscience, philosophy, and pragmatics. Through readings, online and face-to-face discussions, role-plays, scenarios, and presentations students will critically reflect on models of intercultural competence and human rights education and their relation to (student) outcomes; examine the role of social justice and human rights within the teaching of intercultural competence; and integrate and assess intercultural competence in teaching. Taught in English.

5325. Teaching for Intercultural Citizenship and Human Rights II

(Also offered as ALDS 5325 and CLCS 5325.) Three credits.

Continued exploration of the role of intercultural competence and human rights education from a variety of perspectives, including applied linguistics, education, psychology, neuroscience, philosophy and pragmatics. Students will design a research project or curricular unit for a specific

purpose in which they apply models of intercultural competence/ citizenship and human rights in practice. Taught in English.

5332. Studies in German Literature II

Three credits. May be repeated for a total 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 total of 12 credits.

Study of a coherent body of texts drawn from the period from approximately 1890 to the present.

5350. Theater and Human Rights

(Also offered as CLCS 5350.) Three credits.

Exploration of theater and related performing arts as forms of artistic expression and public debate. Analysis of specific characteristics of modern and contemporary theater and exploration of theater's engagement with human rights discourse and interventions in the public sphere. Theoretical texts and recordings of performances will inform class discussions.

5355. German Jewish Literature and Human Rights

(Also offered as CLCS 5355 and HEJS 5355.) Three credits.

Exploration of German Jewish Literature as a form of artistic expression and public debate. Discussion of German Jewish literary writing and its relationship with human rights discourses since the Enlightenment.

5365. German Film Studies

Three credits. May be repeated for a total 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 total 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 total of 4 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 total 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 total 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 a total of 24 credits.

5395. Special Topics

Three credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

5398. Variable Topics

Three credits. May be repeated for a total of 9 credits.

Prerequisites and recommended preparation vary. May be repeated for up to nine credits with a change in content.

5399. Independent Study

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

6420. Seminar in Medieval Literature

Three credits. May be repeated for a total of 12 credits.

6450. Seminar in Nineteenth-Century Literature

Three credits. May be repeated for a total of 12 credits.

6460. Seminar in Twentieth-Century Literature

Three credits. May be repeated for a total of 12 credits.

6480. Investigation of Special Topics

Variable (1-6) credits. May be repeated for a total of 12 credits.

Graduate School (GRAD)

5100. Fundamental Skills for Data Science

Three credits. Prerequisite: Open only to students in the Data Science M.S. program.

Establishes background knowledge in Python and R programming, multivariate calculus and linear algebra, and basic statistics to prepare incoming students for success in the core courses in the M.S. in Data Science Program.

5800. Applied Capstone in Data Science

Three credits. Prerequisite: Enrollment in the M.S. in Data Science program; Department or Unit consent required. Recommended preparation: Nine credits of coursework required for the M.S. in Data Science.

This course will give M.S. in Data Science students a problem-based learning opportunity to apply knowledge and skills gained in core and elective courses to an integrative data science project. Projects for the course come from industry and program partners and will typically require

students to work in small teams to solve a real-world data science problem.

5900. Special Topics in Graduate Education

Variable (1-3) credits. May be repeated for a total of 12 credits.

5910. Responsible Conduct in Research

One credit.

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.

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: To be used by master's students only, not Ph.D. students. May be repeated for a total of 12 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5940. Exchange Studies

Variable (1-9) credits. May be repeated for a total of 18 credits.

This course denotes that the student is participating in a full-time Graduate Exchange. No other courses may be taken concurrently. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5960. Full-Time Master's Research

Three credits. Prerequisite: Open only to graduate students enrolled in a Plan A Master's Degree Program. May be repeated for a total of 12 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5991. Graduate Internship

Variable (1-6) credits. Prerequisite: Open to graduate students; instructor consent required. May be repeated for a total of 9 credits.

Supervised internship work that supports a student's graduate training and career goals. Allows students to participate in an internship while also taking courses. Evaluation is by a field supervisor and major advisor. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5997. Continuous Registration (Certificate)

Zero credits. May be repeated.

This is a non-credit course for which certificate students must register in cases where they are not otherwise registered for coursework but want to remain active in their program.

5998. Continuous Registration (Master's)

Zero credits. Prerequisite: Open only to master's students. May be repeated.

This is a non-credit course for which master's degree students must register in cases where they are not otherwise registered for coursework or thesis preparation but want to remain active in their program.

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 by Plan A master's students who have completed their coursework and who are not registered for any other credit-bearing course but are actively working on their master's theses. May be repeated.

6000. Seminars in College Instruction

One credit. May be repeated for a total of 3 credits.

Explores teaching skills that promote learning within a diverse student body in higher education. 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. May be repeated for a total of 12 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6932. Directed Studies for M.D./Ph.D.

Variable (1-6) credits. May be repeated for credit.

For use of M.D./Ph.D. students at UConn Health to provide them with a credit benefit for their dual degree program. M.D./Ph.D. students enrolling in GRAD 6932 may hold a graduate assistantship and take additional graduate courses, which will allow us to continue integration of the graduate and medical school curricula in the first four semesters of the program. This 15-credit benefit is an approved for UConn dual degree programs and is an important aspect of the M.D./Ph.D. program as it integrates the two degrees programs, which is considered to be a best practice nationally. Grad 6932 will give M.D./Ph.D. students the same 15-credit benefit as DMD/Ph.D. students, reflecting what is already in place in the graduate school for individuals that enter Ph.D. program with a Master's degree in a closely related field. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6940. Exchange Studies

Variable (1-9) credits. May be repeated for a total of 18 credits.

This course denotes that the student is participating in a full-time Graduate Exchange. No other courses may be taken concurrently. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6950. Doctoral Dissertation Research

Variable (1-9) credits. Prerequisite: Open only to doctoral students. May be repeated for credit.

Associated with the research efforts of students pursuing a doctoral degree, and may be used to meet

the fifteen-credit doctoral research requirement. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6960. Full-Time Doctoral Research

Three credits. Prerequisite: Open only to doctoral students. May be repeated for a total of 18 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6998. Continuous Registration (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 they are not otherwise registered for coursework or dissertation preparation but want to remain active in their program.

6999. Dissertation Preparation

Zero credits. Prerequisite: Open only to doctoral students. May be repeated.

A non-credit course to be used by doctoral students who have reached candidacy for the doctoral degree and who are not registered for any other credit-bearing course but are actively working on their dissertations.

Health, Intervention, and Policy (CHIP)

5000. Obesity from an Interdisciplinary Perspective

Three credits. Prerequisite: Instructor consent.

This class will provide a broad base exposure to obesity prevention and weight management, current research issues in the field, leading theoretical frameworks, and recent evidence-based findings.

5100. Interdisciplinary Global Health

Three credits. Prerequisite: Instructor consent.

This course will provide a broad base exposure to global health, current research issues in the field, leading theoretical frameworks, and recent evidence-based findings.

Healthcare Management and Insurance Studies (HCMI)

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 to MBA students, other 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 or instructor consent.

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. Prerequisite: Not open to M.B.A. 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. Prerequisite: Not open to M.B.A. students. May be repeated for a total of 9 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 or instructor consent.

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 or instructor consent.

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 or instructor consent.

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.

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, others with consent. Not open to students who have passed BLAW 5182. May be repeated for a total of 12 credits.

Investigation and discussion of special topics in healthcare management.

5895. Special Topics in Health Care Management

Variable (1-6) credits. May be repeated for a total of 24 credits.

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.

Hebrew and Judaic Studies (HEJS)

5250. Topics in Transnational Jewish History

(Also offered as CLCS 5250 and HIST 5250.) Three credits. May be repeated for a total of 6 credits.

Topics in Jewish history, both transnational in space (European, American, global) and diachronic in time (Early Modern to Late Modern). May be repeated with a change of topic to a maximum of six credits.

5300. Topics in Biblical Studies

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 6 credits.

Topics in the historical, literary and philosophical study of the Bible with special emphasis on current methodological issues.

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.

5311. History and Literature of Talmudic Palestine

Three credits.

A discussion of select topics and texts pertaining to religious, social, and political currents in Talmudic Palestine. Taught in English.

5312. Readings in Talmudic Literature

Three credits. Prerequisite: Open to graduate students in Literatures, Cultures, and Languages; undergraduates by instructor consent. May be repeated for a total of 9 credits.

Selected readings from the Babylonian or Palestinian Talmud. Focus will be either a particular theme or a specific tractate. May be repeated for credit with a change of topic to a maximum of nine credits.

5314. Readings in Midrashic Literature

Three credits. Prerequisite: Open to graduate students in Literatures, Cultures, and Languages; undergraduates by instructor consent. May be repeated for a total of 9 credits.

Selected readings in genres, collections or specific topics in Midrashic literature. May be repeated for credit with a change of topic to a maximum of nine credits.

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. Prerequisite: Open to graduate students in Judaic Studies, Comparative Literature and Cultural 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.

Selected topics in Modern European Jewish History between the Enlightenment and the establishment of the State of Israel.

5355. German Jewish Literature and Human Rights

(Also offered as CLCS 5355 and GERM 5355.) Three credits.

Exploration of German Jewish Literature as a form of artistic expression and public debate. Discussion of German Jewish literary writing and its relationship with human rights discourses since the Enlightenment.

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 with permission.

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. May be repeated for a total of 12 credits.

5395. Special Topics

Three credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

5397. Special Topics in Judaic Studies

Three credits. May be repeated for a total of 24 credits.

5398. Variable Topics

Three credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

5399. Independent Study

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

History (HIST)

5101. Introduction to Historical Research

Three credits.

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: History students in M.A. and Ph.D. programs. May be repeated for a total of 9 credits.

A research seminar for students in the M.A. and Ph.D. programs in history.

5103. Teaching History

Three credits.

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.

A study of historical agencies and museums. Laboratory work and field trips are included.

5141. Introduction to Historical Museum Work II

Three credits.

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. May be repeated for a total of 15 credits.

5198. Variable Topics in History

Three credits. May be repeated for a total of 9 credits.

Detailed study of a specific historical theme or topic with an emphasis on developing skills in research. Topics vary from semester to semester.

5199. Independent Study in History

Three credits. May be repeated for a total of 18 credits.

5201. Theories of History

Three credits.

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.

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. May be repeated for a total of 6 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.

5250. Topics in Transnational Jewish History

(Also offered as CLCS 5250 and HEJS 5250.) Three credits. May be repeated for a total of 6 credits.

Topics in Jewish history, both transnational in space (European, American, global) and diachronic in time (Early Modern to Late Modern). May be repeated with a change of topic to a maximum of six credits.

5270. History of Human Rights

(Also offered as HRTS 5270.) Three credits.

Covers the field's classic texts, controversies, and recent topics. Incorporates political, social, intellectual, and cultural history.

5276. War and Revolution in the Twentieth Century

Three credits.

5316. Topics in Medieval History

Three credits. May be repeated for a total of 9 credits.

5370. Western Europe in the Fifteenth and Sixteenth Centuries

Three credits. May be repeated for a total of 9 credits.

5373. Europe in the Seventeenth Century

Three credits.

5374. Europe in the Eighteenth Century

Three credits.

5410. The French Revolution

Three credits.

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 total of 9 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. May be repeated for a total of 9 credits.

5456. Germany in the Nineteenth and Twentieth Centuries

Three credits.

5462. Topics in Modern British History

Three credits. May be repeated for a total of 9 credits.

5470. Topics in Italian History

Three credits. May be repeated for a total of 9 credits.

5475. Histories of the Body: European Perspectives since 1500

Three credits.

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 1400's-1700's with a geographical focus mostly on Britain, continental Europe, and the Americas.

5510. Topics in Colonial American History

Three credits. May be repeated for a total of 9 credits.

5515. The American Revolution

Three credits.

5520. United States in the Early National Period and the Age of Jackson, 1787-1840

Three credits.

5525. Society and Culture in the Civil War Era, 1830-1880

Three credits.

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.

5540. Topics in American Social and Cultural History, 1600-1876

Three credits.

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.

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.

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. May be repeated for a total of 9 credits.

5555. Topics in the History of American Women

(Also offered as WGSS 5333.) Three credits. May be repeated for a total of 9 credits.

5560. Topics in the History of American Foreign Relations

Three credits.

5565. Topics in the History of Urban America

Three credits. May be repeated for a total of 9 credits.

5570. Topics in Black History

Three credits.

5575. American Maritime History

Three credits.

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 given 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.

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 Latin(o) American History

(Also offered as LLAS 5100.) Three credits.

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. May be repeated for a total of 9 credits.

5622. The Historical Literature of Latin America

(Also offered as LLAS 5622.) Three credits. May be repeated for a total of 9 credits.

The history and historiography of postcolonial Latin America, with particular attention to shifting notions of race, nation, and citizenship, and the emergence of new spatial configurations and social groups pressing for political inclusion and economic rights.

5630. The Historical Development of the Caribbean

Three credits. May be repeated for a total of 6 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. May be repeated for a total of 9 credits.

5837. East Asian History

Three credits.

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.

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: Keywords

(Also offered as AMST 6850 and ENGL 6850.)

Three credits. Prerequisite: Open to graduate students in English, History, and Political Science; open to others with consent. May be repeated for a total of 6 credits.

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.

Human Behavior Elective (HBEL)

5300. Substance Use I: Intro to Alcohol and Other Drugs

Three credits. Prerequisite: Open to students in both the MSW program and the 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 Use II: Prevention and Treatment of Alcohol and Other Drug Use

Three credits. Prerequisite: HBEL 5300; open to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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. Grief and Loss

Three credits. Prerequisite: Open to students in both the MSW program and the STEP program.

This course prepares M.S.W. students for social work practice with clients, along the lifespan, who are experiencing grief as a result of death, illness, disability, loss of home, loss of country of origin, divorce, foster care, and other more symbolic losses. Special consideration for the myriad losses due to the COVID pandemic will be included throughout the course. Theories of attachment and loss are used as a framework for assessing grief reactions in clients in different developmental stages. Special emphasis in this course will also focus on rituals and theories of loss and grief from a world-cultural perspective. Therapeutic interventions are examined and applied through case discussions and experimental exercises that will incorporate a multi-cultural understanding of grief and loss. The use of teletherapy will be explored in general and specifically to grief and loss. Throughout the course, students will examine their own natural reactions and fears regarding loss and grief to increase their awareness of various means of the self-care necessary to successfully work in the field of social work where loss and grief are ever-present clinical themes.

5357. Social Gerontology

Three credits. Prerequisite: Open to students in both the MSW program and the 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.

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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the STEP program.

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 to students in both the MSW program and the STEP program. May be repeated for a total of 4 credits.

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.

Human Development and Family Sciences (HDFS)

5001. Orientation to Human Development and Family Sciences

One credit. Prerequisite: Open to graduate students in Human Development and Family Sciences, others with instructor consent.

Seminar in professional orientation to the field of human development and family sciences.

5003. Research Methods in Human Development and Family Sciences I

Three credits. Prerequisite: Open to graduate students in Human Development and Family Sciences, others with instructor consent.

Family and human development procedures, research experience related to analyzing interpersonal interaction and developmental processes.

5004. Research Methods in Human Development and Family Sciences II

Three credits. Prerequisite: Open to graduate students in Human Development and Family Sciences, others with instructor 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 Sciences

Three credits. Prerequisite: HDFS 5003; open to graduate students in Human Development and Family Sciences, others with instructor consent.

Philosophical bases of qualitative research in the social sciences; developing qualitative strategies; including: existential-phenomenological, intensive interviews, participant observation, and textual analysis.

5006. Professional Development in Human Development and Family Sciences

Three credits. Prerequisite: Open to graduate students in Human Development and Family Sciences, others with instructor consent.

Professional, ethical, and career development issues related to human development and family sciences. Covers conceptual ideas related to ethics as well as practical tools for professional and career development.

5010. Practicum in University Teaching of Human Development and Family Sciences

Three credits.

Supervised teaching of undergraduate courses in Human Development and Family Sciences.

5020. Culture, Health and Human Development

Three credits. May be repeated for a total of 6 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. May be repeated for a total of 6 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. May be repeated for a total of 24 credits.

Supervised research in Human Development and Family Sciences. May be repeated for a maximum of 24 credits.

5031. Culture, Health and Human Development Project

Three credits. May be repeated for a total of 6 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.

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 to graduate students in Human Development and Family Sciences; others with instructor consent. May be repeated for a total of 21 credits.

Work in a community agency related to the field of family development.

5095. Special Topics in Human Development and Family Sciences

Variable (1-3) credits. Prerequisite: Open to graduate students in Human Development and Family Sciences, others with instructor consent. May be repeated for a total of 12 credits.

In-depth investigation of a recent issue of human development and family sciences. With a change of topic, students may enroll up to four times for a maximum of 12 credits.

5098. Current Issues in Human Development and Family Sciences

Variable (1-3) credits. May be repeated for a total of 12 credits.

Focused presentation and discussion of an aspect of theory or methods related to advancing the field of human development and family sciences.

5099. Independent Study

Variable (1-6) credits. May be repeated for credit.

Advanced study for qualified students who present suitable projects for intensive, independent investigation in human development and family sciences.

5101. Infant and Toddler Development

Three credits.

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.

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 to graduate students in Human Development and Family Sciences, others with instructor consent.

Adolescent development; understanding the various forces related to adolescent behavior.

5110. Families, Communities, and Positive Behavior Supports

Three credits.

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 Sciences 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 to graduate students in Human Development and Family Sciences, others with instructor 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 total of 9 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 to graduate students in Human Development and Family Sciences, others with instructor 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 to graduate students in Human Development and Family Sciences, others with instructor 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 to graduate students in Human Development and Family Sciences, others with instructor 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.

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 to graduate students in Human Development and Family Sciences, others with instructor consent.

Human sexual behavior and attitudes.

5310. Patterns and Dynamics of Family Interaction

Three credits. Prerequisite: Open to graduate students in Human Development and Family Sciences, others with instructor consent.

Readings and research concerning the family, stressing interpersonal processes and communication.

5311. Theories of Family Development

Three credits. Prerequisite: Open to graduate students in Human Development and Family Sciences, others with instructor consent.

Concepts and theories in the area of family development.

5312. Diverse Families: Adaptations Across the Lifespan

Three credits. Prerequisite: Open to graduate students in Human Development and Family Sciences; others with instructor 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.

5321. Seminar on Parent-Child Relations in Cross-Cultural Perspective

Three credits. Prerequisite: Open to graduate students in Human Development and Family Sciences, others with instructor 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. Parenting, Parenthood, and Family Science Interventions

Three credits. Prerequisite: Open to graduate students in Human Development and Family Sciences, others with instructor consent.

Parents' roles, identities, and behavior and the dynamics of parenthood across the lifespan. Interpersonal, familial, and societal roles of parents and the interventions that support individual parent and family well-being outcomes are presented.

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.

Human Rights (HRTS)

5005. Special Topics in Human Rights

Three credits. May be repeated for a total of 9 credits.

In-depth investigation of an issue in human rights research.

5055. Theory and Practice of International Criminal Justice

Three credits. Prerequisite: Not open for credit to students who have passed HRTS 3055.

An introduction to foundational concepts of international criminal justice such as international humanitarian and criminal law, genocide, crimes against humanity, war crimes and aggression, and theories of individual criminal responsibility. An exploration of the complex challenges, successes, and failures of international criminal courts and tribunals.

5095. Special Topics

Variable (1-3) credits.

5254. Managing the Future of Social Enterprise

Three credits. Prerequisite: Not open to students who have passed or are taking BADM 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.

5270. History of Human Rights

(Also offered as HIST 5270.) Three credits.

Covers the field's classic texts, controversies, and recent topics. Incorporates political, social, intellectual, and cultural history.

5282. Practicum in Human Rights

Three credits. Prerequisite: Instructor consent.

Project-based fieldwork with an approved partnering organization related to the field of human rights. Practicum provides the students with hands-on experience with real problem solving experiences related to their career goals. A minimum of 200 practicum hours required. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5301. Contemporary Debates in Human Rights

Three credits.

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.

5327. Propaganda, Disinformation, and Hate Speech

(Also offered as ANTH 5327.) Three credits.

Draws on current social science research and legal scholarship to understand the effects of disinformation and hate speech on individual moral decision-making, as well as on wider politics and culture. Evaluates various private and public initiatives to regulate speech.

5351. Topics in Human Rights Practice

Three credits. Prerequisite: Instructor consent. Students may not receive credit for a topic in HRTS 5351 if they have previously passed HRTS 3540 with the same topic. May be repeated for a total of 9 credits.

Seminar on topics in theoretical and practice-based knowledge and skills related to human rights. Topics vary by semester. May be repeated with a change of topic to a maximum of nine credits.

5390. Economic Rights

(Also offered as ECON 5128 and POLS 5390.) Three credits.

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).

5401. Methods in Human Rights Research and Practice

Three credits. Prerequisite: Not open to students who have passed HRTS 5899 when offered as Methods in Human Rights Research and Practice.

An introduction to professional modes of human rights research and practice from multi-disciplinary perspectives. An exploration of roles of data collection, creation, and analysis in policy making and advocacy using principles of human rights evaluation. Examination of the relationship between human rights research and practical interventions affecting human rights outcomes.

5428. Torture

Three credits. Prerequisite: Open to graduate students.

Examination of the use of torture by state and non-state actors, both historically and today. Topics may include: Why torture is perpetrated; extant domestic and international legal frameworks to remedy torture and their effectiveness; the business of torture; and the effect of torture on transitional justice.

5450. Contemporary Issues in Genocide Studies

Three credits.

Interdisciplinary analysis of critical topics in contemporary studies of genocide including the legal and social meaning of genocide and crimes against humanity, the causes and dynamics of genocide and mass atrocities, the immediate and intergenerational effect of genocide on individuals and groups, the question of accountability, and the role of perpetrators and bystanders.

5460. Human Rights and Armed Conflict

Three credits. Prerequisite: Not open for credit to students who have passed HRTS 3460.

Examines the relationship between human rights and armed conflict from a social science perspective. Explores human rights abuses as cause and consequence of armed conflict. Evaluates the effectiveness of the human rights and humanitarian approaches to conflict management.

5499. Independent Study

Variable (1-6) credits. Prerequisite: Open to graduate students only. May be repeated for a total of 12 credits.

5600. Human Rights Practice Lab

Three credits. Prerequisite: Open only to Human Rights 5th-Year M.A. students, instructor consent required.

Critical engagement with human rights issues, strategies, tactics, institutions, and law in a practical setting. Students work collaboratively on a project addressing a pressing human rights issue and refine skills integral to working in the human rights field. Skills include information gathering, ethical analysis, effective communication across diverse audiences, and creative problem-solving.

5825. Sociology of Human Rights

(Also offered as SOCI 5825.) Three credits. Prerequisite: Instructor consent.

Critical sociological perspective on human rights, with a specific emphasis on power, inequalities, and people's struggles to claim and access political, civil, economic, social and cultural human rights.

5899. Seminar in Human Rights

Three credits. May be repeated for a total of 9 credits.

Variable topics in the study of human rights.

6825. Topics in the Sociology of Human Rights

(Also offered as SOCI 6825.) Variable (3-9) credits. Prerequisite: Instructor consent. May be repeated for a total of 9 credits.

Topics in sociological theory and research in human rights. Topics will vary by semester. May be repeated to a maximum of nine credits.

Independent Study (Social Work) (IS)

5394. Independent Study

Variable (1-9) credits. Prerequisite: Open only to students enrolled in the MSW program. May be repeated for a total of 9 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 (Social Work) (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 IGFP 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 MSW students in the Individuals, Groups and Families concentration. Corequisite: IGFP 5353 and FED 5310, 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: IGFP 5302; 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 Social Work MSW and non-degree 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. Clinical Conditions with Groups

Three credits. Prerequisite: FED 5301; open only to M.S.W. students in the Individuals, Groups and Families concentration.

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.

5343. Clinical Conditions with Families

Three credits. Prerequisite: FED 5301; open only to M.S.W. students in the Individuals, Groups and Families concentration. Recommended preparation: BASC 5391.

This course provides a theoretical and evidence-based perspective on engaging, involving and supporting families to meet the needs of family members with clinical conditions. Content will include assessment of and family-centered

interventions for various types of clinical conditions and family interaction issues, using the DSM-5 and family-centered theories to understand family risks and resiliencies that affect clinical conditions in individuals. This course will emphasize strength-based and family-centered approaches to ethical social work practice with families. Included in the content will be online and in-class discussions to assist students in developing knowledge of and respect for cultural differences and differences in family formations, such as single parent families, families across the life cycle, adoptive families, families affected by immigration/displacement, multi-generational families and LGBTQI+ families. This course will use lectures, online discussion, small group activities and case-based approaches to learning, using a wide range of family types as part of this learning strategy.

5345. Clinical Conditions with Children and Adolescents

Three credits. Prerequisite: FED 5301; open only to M.S.W. students in the Individuals, Groups and Families concentration.

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; open only to M.S.W. students in the Individuals, Groups and Families concentration.

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 MSW students in the Individuals, Groups and Families concentration. Corequisite: FED 5310 and IGFP

5302. Not open for credit to students who have passed CSWK 5353 or GRWK 5353.

Focuses primarily on the student's method concentration, emphasizing preparation for competent, advanced specialized practice. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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. IGFP 5353; open only to MSW students in the Individuals, Groups and Families concentration. Corequisite: IGFP 5303 and FED 5311. Not open to students who have passed CSWK 5354 or GRWK 5354.

Focuses primarily on the student's method concentration, emphasizing preparation for competent, advanced specialized practice. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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. Not open for credit to students who have passed CSWK or GRWK 5355.

Field education in Individuals, Groups and Families for well-prepared students who have completed all course requirements except the second year of field education. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5365. Family Therapy: Theory and Practice

Three credits. Prerequisite: FED 5301 or Advanced Standing; open only to MSW students in the IGFP subplan.

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.

Institute for Systems Genomics (ISG)

5091. Internship

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 6 credits.

Experiential learning to integrate knowledge and theory from the classroom with practical application and skills development in a professional setting. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5095. Investigation of Special Topics

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 9 credits.

Comprehensive coverage of topic with emerging issues, significant trends, unique perspectives, or major advances.

5099. Independent Study

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 9 credits.

Independent investigation toward scholarship in the discipline.

5100. Foundations of Genetic and Genomic Medicine

Three credits. Prerequisite: Only open to graduate students currently enrolled in the Clinical Genetics and Genomics certificate, others with instructor consent.

Foundational concepts and application of genetics and genomics in the context of human disease.

5101. Principles of Human Embryology and Teratology

Three credits. Prerequisite: Only open to graduate students currently enrolled in the Clinical Genetics and Genomics certificate, others with instructor consent.

Investigation of fundamental mechanisms underlying normal and abnormal development related to embryogenesis and organogenesis. Relates defects in development to congenital anomalies.

5102. Clinical Applications of Genetic and Genomic Technologies

Three credits. Prerequisite: Only open to graduate students currently enrolled in the Clinical Genetics and Genomics certificate, others with instructor consent.

Principles, clinical applications, and interpretation of genetic and genomic testing methods.

5103. Theories and Methods of Clinical Genetics

Three credits. Prerequisite: Only open to graduate students currently enrolled in the Clinical Genetics and Genomics certificate, others with instructor consent.

An Introduction to the theoretical framework, skillsets, and applications necessary to provide scientific communication of genetics and genomics, resources, diagnoses, and counseling in the clinical setting.

5140. Systems Medical Genetics

Three credits. Prerequisite: Instructor consent. Recommended preparation: ISG 5100, 5102, 5103, 5730.

Focuses on the connections between human development and inherited disease. Includes core principles of development of the body plan and signaling pathways involved in development and differentiation. Discusses fundamental principles regarding congenital malformations, dysmorphology and syndromes. Discussion of a number of genetic disorders from a systems approach. Discussions include diagnosis, etiology, genetics, prognosis and management. Either semester and summer. Online.

5141. Metabolic and Cardiovascular Genomics

Three credits. Prerequisite: Instructor consent. Recommended preparation: ISG 5100, 5102, 5103, 5140, 5730.

Focuses on the connections between human development and inherited disease. The course will include core principles of inborn errors of metabolism and cardiovascular genomics.

5142. Clinical Cancer Genetics

Three credits. Prerequisite: Instructor consent. Recommended preparation: ISG 5100, 5102, 5103, 5140, 5730.

Provides knowledge and skills fundamental to the practice of cancer genetic counseling. Students will apply cancer genetics knowledge to multiple clinical situations. This course will cover hereditary cancer syndromes, cancer risk assessment models, and germline and somatic genomic testing. Either semester and summer. Online.

5200. Communication and Counseling Skills for Effective Health Care Conversations

Three credits. Prerequisite: Only open to Clinical Communication and Counseling certificate students. Students in the Health Care Genetics or Genetic Counseling programs may enroll with respective Program Director consent.

Theoretical knowledge and practical communication, counseling and support skills for the benefit of connecting practitioners and consumers within the context of health care and genomics.

5201. Cultural Awareness: Working with Diverse Populations in Health Care

Three credits. Prerequisite: Only open to Clinical Communication and Counseling certificate students. Students in the Health Care Genetics or Genetic Counseling programs may enroll with respective Program Director consent.

Connecting the impact of cultural differences with the delivery of counseling services and health care discussions.

5202. Creating a Therapeutic Alliance

Three credits. Prerequisite: Only open to Clinical Communication and Counseling certificate students. Students in the Health Care Genetics or Genetic Counseling programs may enroll with respective Program Director consent.

Critical concepts and application of health literacy, health communication, and provider-consumer communication models.

5203. Death, Dying, Grief, and Coping

Three credits. Prerequisite: Only open to Clinical Communication and Counseling certificate students. Students in the Health Care Genetics or Genetic Counseling programs may enroll with respective Program Director consent.

Critical concepts of death, loss, and grief and their impact on consumer-provider discussions of death, within a health care setting.

5301. Concepts in Genomic Data Analysis I

Two credits. Prerequisite: Corequisite: ISG 5311. Recommended preparation: Undergraduate degree in biology or related discipline. Background in genetics.

Fundamentals of genomic data analysis, high throughput sequencing technologies, and computational tools and infrastructure used to analyze and communicate results from genomic data.

5302. Concepts in Genomic Data Analysis II

Two credits. Prerequisite: ISG 5301 and 5311. Corequisite: ISG 5312. Recommended preparation: Undergraduate degree in biology or related discipline. Background in genetics.

In-depth introduction to genome assembly, variant detection, functional genomics, and tools

to manage bioinformatic code-bases and ensure reproducibility, git and nextflow.

5311. Genomic Data Analysis in Practice I

Four credits. Prerequisite: Corequisite: ISG 5301. Recommended preparation: Undergraduate degree in biology or related discipline. Background in genetics.

Practical introduction to genomic data analysis. Introduction to coding using Linux/bash, R/tidyverse and SLURM on a high performance computing cluster through the use of real data.

5312. Genomic Data Analysis in Practice II

Four credits. Prerequisite: ISG 5301 and 5311. Corequisite: ISG 5302. Recommended preparation: Undergraduate degree in biology or related discipline. Background in genetics.

Practical instruction in how to accomplish various genomic workflows including genome assembly, variant detection, differential expression using RNA-seq.

5496. Laboratory Rotation

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 9 credits.

Introduction to research questions and techniques within a specialized discipline of systems genomics.

5601. Interpreting Clinical Genomic Data

Three credits. Prerequisite: Instructor consent. Recommended preparation: ISG 5100, 5102, 5103, 5730.

Interrogation of database resources for the identification and interpretation of genetic variation in the context of clinical case management. Accurate communication of genetic information in an accessible format according to established guidelines. Either semester and summer. Online.

5730. Professional Skills and Competencies

Variable (1-2) credits. May be repeated for a total of 10 credits.

Career skills development toward effective practice in health care research, diagnostic and/or clinic settings. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Institute of Materials Science (IMS)

5301. Microstructural and Morphological Analyses

(Also offered as CHEM 5301.) Three credits.

Lecture on sample preparation and analyses for optical and electron microscopy methods including scanning electron microscopy, transmission electron microscopy, energy dispersive X-ray analysis, focused ion beam methods, and electron energy loss spectroscopy.

5302. Structural Analysis

(Also offered as CHEM 5302.) Three credits.

Lecture on sample preparation and analyses for X-ray diffraction, X-ray fluorescence, X-ray imaging, Rietveld refinement, Thin Film X-ray Analyses, and In Situ methods.

5303. Compositional Analyses

(Also offered as CHEM 5303.) Three credits.

Lecture on sample preparation and analyses, for characterization of compositions of materials. Methods to be discussed include titrations,

atomic absorption, inductively coupled plasma mass spectrometry, infrared, Raman, Ultraviolet visible, fluorescence, chromatography, and mass spectrometry.

5304. Surface and Interfacial Analysis

(Also offered as CHEM 5304.) Three credits.

Lecture on sample preparation and analyses for surfaces and interfaces, including scanning Auger microscopy, secondary ion mass spectrometry, X-ray photoelectron spectroscopy, contact angle measurements, and temperature program methods.

International Studies (INTS)

5000. Seminar in International Studies

Three credits.

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. May be repeated for a total of 15 credits.

Italian Literature 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 total of 9 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 a total of 24 credits.

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 to graduate students in Italian, others with permission of instructor. May be repeated for a total of 6 credits.

A variable topics course focusing on early modern Italian culture.

5376. Topics in Modern and Contemporary Italian Studies

Three credits. Prerequisite: Open to graduate students in Italian, others with permission of instructor. May be repeated for a total of 6 credits.

A variable topics course focusing on modern and contemporary Italian culture.

5377. Topics in Transnational Italy

Three credits. Prerequisite: Open to graduate students in Italian, other with instructor consent. May be repeated for a total of 6 credits.

Variable topics course focusing on cultural, historical and political intersections between Italy and other nations.

5395. Special Topics

Three credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

5398. Variable Topics

Three credits. May be repeated for a total of 9 credits.

May be repeated for up to nine credits with a change in content.

5399. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

May be repeated for up to 12 credits with a change in content.

Kinesiology (KINS)

5099. Independent Study

Variable (1-6) credits. May be repeated for credit.

5100. Musculoskeletal Examination and Acute Treatment I

Two credits. Prerequisite: KINS 5200.

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.

5101. Musculoskeletal Examination and Acute Treatment II

Four credits. Prerequisite: Must complete KINS 5100 with a C or better.

Introduces students to the common types of orthopedic injuries and/or dysfunctions that occur to the lower 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.

5102. Therapeutic Interventions in Athletic Training I

Four credits. Prerequisite: KINS 5100; PT 5410 and 5412.

An integrated approach to the treatment and rehabilitation of athletic injuries and conditions. Discusses the physiology and phases of healing with regards to specific types of tissue, various tissue responses to different types of training modalities, the theory behind common treatment modalities, and rehabilitation paradigms. Students will take an active role in learning to plan, implement, document, and evaluate the efficacy of therapeutic interventions in the treatment of physically active people with musculoskeletal injuries.

5103. Therapeutic Interventions in Athletic Training II

Three credits. Prerequisite: KINS 5102; PT 5410 and 5412.

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.

5106. Emergency Procedures in Athletic Training

Four credits. Prerequisite: Must possess CPR, AED, and first aid certification.

Evaluation and treatment skills for athletic injuries to the head, face, neck, trunk, thorax, abdomen, and those caused by the environment. Acute first-aid considerations in life-threatening situations will also be covered in-depth.

5107. Orthopedic Assessment and Treatment of the Head and Spine

Four credits. Prerequisite: Instructor consent.

Covers anatomy, evaluation, pathology of spinal injuries and conditions, diagnosis, and management of injuries related to the head, spine, thorax, and core.

5109. Medical Aspects and Pharmacology in Athletic Training

Four credits. Prerequisite: Open to Athletic Training students.

This course will prepare 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. Management of these conditions, which may include prescription or over the counter drugs will be discussed as well. Additionally, this course will provide athletic training students with information regarding the relationship between nutrition and physical fitness for the purpose of developing individualized nutrition plans for physical fitness and general well being.

5110. Leadership, Administration, and Professional Development in Athletic Training

Two credits. Prerequisite: Instructor consent.

The course will cover concepts for student's majoring in athletic training regarding professional development and healthcare administration and organization. The lecture and discussion format of the course will include 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.

5111. Practical Applications of Injury Assessment and Care

Three credits. Prerequisite: KINS 5204.

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. A comprehensive review of content in preparation for the Board Examination will also be done throughout the course.

5112. Behavioral Health Considerations for Athletic Trainers

Three credits. Prerequisite: Instructor consent.

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.

5200. Foundations of Athletic Training Clinical Education

One credit. Prerequisite: Open only to Athletic Training students.

Students will learn the didactic and clinical foundational skills necessary to begin their formal clinical education experiences.

5201. Athletic Training Experience I

Two credits.

In this practicum experience the student works directly with a certified athletic trainer and is assigned to a specific athletic training practice setting. It involves providing day-to-day care for the participants, as well as administering treatments and rehabilitation under supervision of the preceptor.

5202. Athletic Training Clinical Experience II

Three credits. Prerequisite: KINS 5201.

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.

5204. Clinical Immersion II

Three credits. Prerequisite: KINS 5202; instructor consent required.

In this practicum course, students work directly with a certified athletic trainer and is 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. Athletic Training Clinical Immersion II

Three credits. Prerequisite: KINS 5204.

Students work directly with a certified athletic trainer and is 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.

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. 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, 5594 and instructor consent required.

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.

5509. Clinical Exercise Physiology

Three credits. Prerequisite: KINS 5507 and instructor consent. Recommended preparation: Human anatomy and physiology.

An in-depth examination and application of the principles of clinical exercise physiology. Students will advance their knowledge and understanding of the body's adaptations to exercise across the lifespan in all major relevant systems, including musculoskeletal, nervous, endocrine, cardiovascular, and respiratory, as well as the metabolic responses to exercise. An understanding of how the body responds to acute and chronic exercise is crucial for the health care professional, fitness expert, strength coach, or personal trainer.

5511. Sitting is the New Smoking

Three credits. Prerequisite: KINS 5507 and instructor consent. Recommended preparation: Human anatomy and physiology.

Addresses concepts related to how appropriate movement and posture can promote a lifetime of physical activity and optimal joint health. The course will integrate foundational concepts with current literature related to joint injury. Strongly recommended for all clinicians in athletic training, physical therapy, and sport performance fields.

5512. Preventing Sudden Death in Sport

Three credits.

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.

5522. Scientific Instrumentation in Human Movement

Three credits. Prerequisite: Open to graduate students in Kinesiology; others by departmental consent.

A course for graduate exercise science students focusing on the assessment of human movement using advanced instrumentation for data collection within both clinical and research contexts. Students will acquire skills in motion capture technology, transcranial magnetic stimulation, isokinetic testing, electromyography, quantitative sensory testing, and diagnostic ultrasound. Applications will consider diverse patient/client populations.

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.

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.

5594. Fundamentals of Conducting Systematic Reviews

Three credits. Prerequisite: KINS 5507 and instructor consent.

An application of the best practices for conducting scientific systematic review on a topic related to the use of exercise/physical activity as medicine. Students will advance their knowledge in systematically searching the literature with a medical librarian, triaging potentially qualifying studies, data extraction and coding, synthesizing data and critiquing the literature, and writing scientifically. KINS 5594 is a prerequisite for KINS 5508 Exercise Prescription for Chronic Diseases and Health Conditions.

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.

5596. Capstone in Exercise Prescription

Three credits. Prerequisite: KINS 5507, 5508, 5509, 5510, 5594, 5595 and instructor consent required.

Capstone course for the M.S. in Exercise Prescription Professional Degree Program. The application of best practices for conducting and writing scientific systematic reviews and preparing and delivering an online educational presentation of a scientific systematic review on a topic related to the use of exercise/physical activity as medicine. Students will advance their knowledge in the use of exercise/physical activity as medicine for healthy adults, healthy populations with special considerations, populations with chronic diseases and health conditions, and unique special considerations in exercise prescription.

6094. Seminar

Variable (1-6) credits. May be repeated for a total 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.

Lectures and discussions to cover topics related to workplace structure, organizational culture, professional socialization and professional development.

6106. Qualitative Research Methods

Three credits.

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.

6425. Special Topics in Health and Wellness Across the Lifespan

Three credits.

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.

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.

Latino and Latin American Studies (LLAS)

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.

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. May be repeated for a total of 12 credits.

5110. Independent Study

Variable (1-6) credits. May be repeated for a total of 15 credits.

5300. Special Topics in Puerto Rican and Latin American Studies

Three credits. May be repeated for a total of 6 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.

5525. Race, Immigration, and Reproduction

(Also offered as SOCI 5525.) Three credits.

This interdisciplinary course considers intersections of race, immigration, and reproduction within the United States and in a transnational context.

5622. The Historical Literature of Latin America

(Also offered as HIST 5622.) Three credits. May be repeated for a total of 9 credits.

The history and historiography of postcolonial Latin America, with particular attention to shifting notions of race, nation, and citizenship, and the emergence of new spatial configurations and social groups pressing for political inclusion and economic rights.

5800. Race in the Formation of the Human Sciences

(Also offered as ANTH 5800, POLS 5800, and PHIL 5800.) Three credits. Prerequisite: Not open for credit to students who have passed PHIL 5380.

Exploration of how race and the human sciences emerged out of the theological, epistemological, and political upheavals that resulted in the Euromodern world.

5890. Latin American Studies Project

Three credits.

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.

6470. Racial Justice and Decoloniality in Higher Education Teaching

(Also offered as AFRA 6470 and EDLR 6470.) Three credits. Recommended preparation: EDLR 5201, 6467; GRAD 6000, 6001.

Theory and practice of how teaching within a higher education context can work toward racially

equitable learning experiences and decoloniality of the classroom.

Linguistics (LING)

5000. Introduction to Computational Linguistics

Three credits. Prerequisite: Open to graduate students in Linguistics and others with consent of Instructor. 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 to graduate students in Linguistics, others with consent. May be repeated for a total of 3 credits.

5110. Acquisition I

Three credits. Prerequisite: Open to graduate students in Linguistics, others with consent.

Relationship between children's language and linguistic theory.

5120. Acquisition II

Three credits. Prerequisite: LING 5110.

Lectures and discussion of classic and current articles in first language acquisition; presentation of ongoing student research.

5310. Phonology I

Three credits. Prerequisite: Open to graduate students in Linguistics, 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 to graduate students in Linguistics, 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 total of 6 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 to graduate students in Linguistics, 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 total of 12 credits.

6020. Professional Methods

One credit.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6040. Structure of a Selected Language

Three credits. Prerequisite: LING 5310 and LING 5510. May be repeated for a total of 12 credits.

Phonological and syntactic problems of a given language.

6050. Field Methods in Linguistics

Three credits. Prerequisite: LING 5310 and LING 5510. May be repeated for a total 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 total 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.

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 total of 12 credits.

Advanced work in phonology.

6410. Semantics Seminar

Three credits. Prerequisite: LING 5420. May be repeated for a total 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 total of 12 credits.

Current topics in semantic research.

6510. Readings and Research in Syntax

Three credits. Prerequisite: LING 5520. May be repeated for a total 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 total of 12 credits.

Advanced work in syntax.

6530. Comparative Syntax

Three credits. Prerequisite: LING 5520. May be repeated for a total 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 LING 5510. May be repeated for credit.

Topics in general linguistics at an advanced level.

6799. Independent Study in Linguistics

Variable (1-6) credits. May be repeated for credit.

6899. Directed Research in Linguistics

Variable (1-6) credits. May be repeated for a total of 9 credits.

Independent Study.

Literatures, Cultures, and Languages (LCL)

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 LCL graduate students.

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 to graduate students in LCL, 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 LCL graduate students. May be repeated for a total of 5 credits.

Theory and practice of research methods in the fields of literature, language and culture. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6020. Advanced Theory for the Study of Literatures, Cultures and Languages

Three credits. Prerequisite: Open only to LCL graduate students.

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 to graduate students in LCL, others with instructor 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 LCL graduate students. May be repeated for a total of 9 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.

6295. Special Topics

Variable (1-3) credits. May be repeated for a total of 6 credits.

6298. Variable Topics

Variable (1-3) credits. May be repeated for a total of 6 credits.

Prerequisites and recommended preparation vary.

6299. Independent Study

Variable (1-3) credits. May be repeated for a total of 6 credits.

Management and Entrepreneurship (MENT)

5138. Managing Organizations

Three credits. Prerequisite: Open to MBA students, others with consent. Not open to students who have passed or are currently enrolled in MENT 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. Formerly offered as MGMT 5138.

5181. Value Creation and Competition

1.5 credits. Prerequisite: Open only to MBA students, others with consent. Not open 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. Formerly offered as MGMT 5181.

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. Formerly offered as MGMT 5182.

5183. Organizational Behavior in Context

1.5 credits. Prerequisite: MENT 5182.

Builds upon the individual and team managerial skills developed in MENT 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. Formerly offered as MGMT 5183.

5184. Strategic Fit and Coordination

1.5 credits. Prerequisite: MENT 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. Formerly offered as MGMT 5184.

5223. Managing Innovation and Change

Three credits. Prerequisite: MENT 5138 or 5183, either of which may be taken concurrently; open 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. Formerly offered as MGMT 5223.

5250. Consultative Management for Business Functional 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. Formerly offered as MGMT 5250.

5335. Venture Planning, Management, and Growth

Three credits. Prerequisite: MENT 5138 or 5183, either of which may be taken concurrently; open 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. Formerly offered as MGMT 5335.

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. Formerly offered as MGMT 5377.

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. Formerly offered as MGMT 5401.

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. Formerly offered as MGMT 5420.

5615. Leadership

Three credits. Prerequisite: MENT 5138 or 5183, either of which may be taken concurrently; open 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. Formerly offered as MGMT 5615.

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. Formerly offered as MGMT 5620.

5634. Opportunity Generation, Assessment, and Promotion

Three credits. Prerequisite: MENT 5138 or 5183, either of which may be taken concurrently; open 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. Formerly offered as MGMT 5634.

5637. Organization Behavior

Three credits. Prerequisite: Open to M.B.A. and M.P.S. 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. Formerly offered as MGMT 5637.

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. Formerly offered as MGMT 5639.

5640. International Business

Three credits. Prerequisite: MENT 5138 or 5183, either of which may be taken concurrently; open 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. Formerly offered as MGMT 5640.

5650. Interpersonal Relations, Influence, and Ethical Leadership

Three credits. Prerequisite: MENT 5138 or 5183, either of which may be taken concurrently; open 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. Formerly offered as MGMT 5650.

5672. Leading Yourself

Three credits. Prerequisite: MENT 5138 or 5183; open to MBA students, others with permission.

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. Formerly offered as MGMT 5672.

5674. Negotiation Strategies

Three credits. Prerequisite: MENT 5138 or 5183, either of which may be taken concurrently; open 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. Formerly offered as MGMT 5674.

5675. Business Acumen and Strategic Human Resource Management

Variable (1-3) credits. May be repeated for a total of 3 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. Formerly offered as MGMT 5675.

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. Formerly offered as MGMT 5676.

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. Formerly offered as MGMT 5678.

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. Formerly offered as MGMT 5680.

5681. Human Capital and Teams

Three credits. Prerequisite: Department consent; open to Human Resource Management students.

Securing and retaining human capital is vital for organizational competitiveness. However, that capital needs to be effectively developed and deployed to transform it into valuable human resources (HR), and teams are often the mechanism by which this occurs. In this class, we will draw upon participants' experiences and current organizational examples to describe different human resource architectures (i.e., different bundles of HR programs for different employee populations). We will then consider the use and composition of different types of teams for enhancing performance and development in those different circumstances. We will also consider interventions that help teams to start off on the right path (e.g., charters, role specifications), how to sustain performance (e.g., team training and development, effective meetings), and how to use

feedback and adapt over time (e.g., after action reviews, debriefs). This will be a hands-on course where participants must apply the course material to their team experiences. Formerly offered as MGMT 5681.

5800. Strategy, Policy, and Planning

Three credits. Prerequisite: Open to MBA students, others with permission. Not open to students who have passed MENT 5184.

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. Formerly offered as MGMT 5800.

5805. Human Resource Management Capstone

Three credits. Prerequisite: HRM masters students only.

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. Formerly offered as MGMT 5805.

5893. Management Internship

Three credits.

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. Formerly offered as MGMT 5893.

5894. Seminar

Variable (1-3) credits. Prerequisite: MENT 5138 or 5183; open to MBA students, others with permission. May be repeated for a total of 12 credits.

Investigation and discussion of special topics in management. Formerly offered as MGMT 5894.

5895. Special Topics in Management

Variable (1-3) credits. 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 management. Emphasis, selected by the student, may be on theoretical or applied aspects. A written report is required. Formerly offered as MGMT 5895.

6200. Directed Readings in Special Topics

Variable (1-6) credits. Prerequisite: Open only to Ph.D. students in the School of Business. May be repeated for a total of 12 credits.

Formerly offered as MGMT 6200.

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. Formerly offered as MGMT 6201.

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. Formerly offered as MGMT 6202.

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. Formerly offered as MGMT 6203.

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. Formerly offered as MGMT 6204.

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. Formerly offered as MGMT 6206.

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. Formerly offered as MGMT 6405.

6408. Seminar in Strategic Entrepreneurship, Innovation, and New Ventures

Three credits.

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. Formerly offered as MGMT 6408.

Manufacturing Engineering (MFGE)

5110. Advanced Manufacturing Quality Control

Three credits. Prerequisite: Department consent required.

Concepts and techniques of real time statistical process control. Statistical analysis will primarily be conducted using software like Excel/Minitab/R. Students will be introduced to measurement system analysis and hypothesis testing techniques to obtain and test for quality data. These techniques will be applied using design of experiments. Process optimization methods like the Taguchi method will be implemented and control charts will be studied.

5120. Advanced Manufacturing Processes and Products

Three credits. Prerequisite: Department consent required.

Integrated analysis of traditional and non-traditional manufacturing processes. Topics include tolerance/ precision, surface finish/ roughness, material properties of products such as hardness, and specific processes such as cutting, welding, metal deformation, ceramic processing, powder processing/metallurgy, and additive manufacturing.

5130. Manufacturing Automation and Industry 4.0

Three credits. Prerequisite: Department consent.

Theory of automation as related to manufacturing and design integration, including hardware, software, and algorithm issues involved in fast and flexible product development cycles. Topics cover automated manufacturing systems, CAD-CAM and integration, programming and simulation, robotics, reverse engineering virtual reality, and sensor fusion for machine tool monitoring.

5140. Manufacturing Systems Planning

Three credits. Prerequisite: Department consent.

Decision making in production, process, and warehouse environments. Topics include analysis of production flows, bottlenecks and queuing, types of manufacturing operations, aggregate production planning, lot sizes and lead times, and pull production systems, warehouse layout, and inventory management.

5210. Data Science for Materials and Manufacturing

(Also offered as ME 5702 and SE 5702.) Three credits. Prerequisite: Undergraduate degree in engineering or computer science, departmental or unit consent required. Recommended preparation: Knowledge or coursework in probability and statistics. Ability to read, interpret and modify Python and MATLAB code. Ability to use Python and MATLAB for analyzing data for the course project.

This course will provide students with data analytics skills for knowledge discovery and design optimization. The students will also learn how to apply data mining and machine learning techniques to tackle the challenges in manufacturing and computational materials engineering. Topics include basic concepts of supervised/unsupervised

learning, design of experiments and data collection, material image processing, surrogate modeling, optimization and model calibration, multi-fidelity modeling, and applications of data analytics in manufacturing and computational materials engineering problems.

5220. Composites Manufacturing

(Also offered as ME 5443.) 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).

Marine Sciences (MARN)

5010. Biological Oceanography

Three credits. Prerequisite: Not open 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.

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. Techniques in Marine Molecular Biology

Three credits. Prerequisite: Not open to students who have passed MARN 3015.

Principles and technology in molecular genetics, including nucleic acid purification and manipulation, DNA fingerprinting, gene cloning and sequencing, phylogenetic analysis, and detection of gene expression.

5016. Marine Zooplankton

Three credits. Prerequisite: EEB 2244E or EEB 2245E or MARN 5010.

Bioenergetics, life history, population and community ecology of zooplankton, and role of zooplankton in aquatic biogeochemical cycles.

5017. Plankton Ecology

Three credits.

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 foodweb 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.

5052. Paleoceanography

Three credits. Prerequisite: Not open for credit to students who have passed MARN 4052.

Exploration of how the geologic record, geochemical proxies and model simulations can be used to understand climate change at centennial and longer timescales, with an emphasis on oceanographic processes. Topics include global overturning circulation, carbon cycle dynamics,

and feedback mechanisms that govern long-term climate variability.

5060. Dynamic Physical Oceanography

Three credits. Recommended preparation: Undergraduate courses in Physics and Calculus and elementary computing skills.

Introduction to a theoretical and computational understanding of physical processes that control the structure and circulation in the ocean and atmosphere. Topics include the global energy balance, thermodynamics and stability, fundamental geophysical fluid mechanics, surface gravity waves, tides and other long waves.

5061. Advanced Dynamical Oceanography

Three credits. Prerequisite: MARN 5060.

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. Recommended preparation: calculus and general physics.

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.

5068. Ocean Fluid Dynamics

Three credits.

Physical processes controlling the circulation and mixing of the ocean focusing on small scale processes with short time scales. Topics include fundamental fluid mechanics, thermodynamics, turbulence, waves, wave-current interactions, and air-sea interaction.

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.

5201. Oceanographic Expedition

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 6 credits.

Development of skills with modern and traditional methods used in making physical, chemical, biological and geological observations at sea from the R.V. Connecticut. Students should be prepared for a three-day or longer expedition. Instrumentation, methods, data analysis and synthesis will be conducted in pre- and post-cruise seminars. May be repeated to a maximum of six credits with a change of topic.

5202. Models of the Ocean Carbon Cycle

Four credits. Prerequisite: Not open for credit to students who have passed MARN 4202Q.

Introduction to the chemical/biological reactions and transport dynamics of ocean models with the focus on attribution of anthropogenic carbon in the global ocean. Quantitative topics include mass balances, the coupled dynamics of oceans and the atmosphere as biogeochemical systems, and parameterizations of important biogeochemical processes.

5210. Experimental Design in Marine Ecology

Three credits. Prerequisite: Not open for credit to students who have passed MARN 4210Q.

Introduction to experimental design and data analysis for marine biology and ecology. Analysis and visualization of experimental data using the statistical software package R. Topics include analysis of variance, replication and pseudoreplication, factorial designs, and significance testing.

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 total of 6 credits.

Intensive reading, evaluation and critical discussion of current interdisciplinary topics presented at weekly departmental research seminars. May be repeated for credit.

5812. Seminar in Marine Biodiversity and Conservation

Three credits. Prerequisite: 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. May be repeated for a total of 8 credits.

Readings and discussions of current literature in oceanography. Topics vary each semester:

Biological, Chemical, Physical, Geological. May be repeated for credit.

5895. Special Topics

Variable (1-6) credits. May be repeated for a total of 24 credits.

A new or pilot course offering in Marine Sciences. May be repeated with a change of topic.

5896. Research

Variable (1-6) credits. May be repeated for a total of 15 credits.

Field and laboratory research covering selected topics of marine sciences.

5899. Independent Study

Variable (1-6) credits. May be repeated for a total of 24 credits.

Independent study under the direction of a faculty member.

6001. Mathematical Models in Marine Sciences

Two credits. Prerequisite: Nine graduate credits in MARN 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 total of 8 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.

6012. Marine Genomics

Three credits. Prerequisite: MARN 5010 or instructor consent. Not open for credit to students who have passed MARN 5995 when offered as Marine Genomics.

Concepts and principles of Genomics and other forms of -omics (transcriptomics, proteomics, metabolomics), resources and methods of analyses, and recent advances in biological oceanography and marine biogeochemistry achieved through the -omic approach.

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.

6032. Environmental Organic Chemistry I

Three credits. Prerequisite: MARN 5030 or instructor consent. Not open for credit to students who have passed MARN 5995 when offered as Environmental Organic Chemistry I."

Environmental factors governing the processes that determine the fate of organic compounds in natural and engineered systems. Quantitative assessments based on thermodynamic principles of the environmental behavior of organic compounds. Topics include multimedia partitioning between air, water, and particles; photochemical and biodegradation models.

6033. Environmental Organic Chemistry II

Three credits. Prerequisite: MARN 6032 or instructor consent. Not open for credit to students who have passed MARN 5995 when offered as Environmental Organic Chemistry II.

Environmental factors governing the processes that determine the fate of organic compounds in natural and engineered systems. Quantitative assessments based on thermodynamic principles of the environmental behavior of organic compounds. Topics include: multimedia partitioning between air, water, and particles; photochemical and biodegradation models.

6034. Trace Elements in Aquatic Ecosystems

Three credits. Prerequisite: MARN 5030 or instructor consent. Not open for credit to students who have passed MARN 5995 when offered as Trace Elements and Isotopes.

Global biogeochemical cycles of trace elements and their impact on ecosystem function and biogeochemistry. Trace elements include required (nutrient), potentially toxic, metals and metalloids. Topics include biogeochemical tracers, reaction rates, chemical speciation, equilibria, solubility, oxidation-reduction, adsorption, complexation, and relationships to the marine food web and human activity.

6088. Variable Topics

Variable (1-6) credits. May be repeated for a total of 24 credits.

With a change in content, may be repeated for credit.

Marketing (MKTG)

5115. Marketing Management

Three credits. Prerequisite: Open only to MBA, MSBAPM, and MS Data Science students with a Marketing Analytics concentration, others with consent. Not open to students who have passed MKTG 5182.

This course provides an introduction to key marketing concepts of interest to all business managers. Students learn to think strategically about customers and competition and develop an understanding of how firms manage products, prices, channels and promotions in an integrated manner. Students gain experience identifying opportunities and threats in the market environment, and making segmenting, targeting, and positioning decisions.

5220. Big Data and Strategic Marketing

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182; OPIM 5103 or 5603, or BADM 5103, 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 MKTG 5182.

This course provides strategies and tools to develop and commercialize new products. Students learn how to evaluate new product ideas, integrate cross-functional innovation processes, allocate new product investments, accelerate new product commercialization, and forecast sales of new products. Students gain experience developing and evaluating new product concepts.

5250. Marketing Research and Intelligence

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182.

This course provides a framework and tools for obtaining and using data to gain marketing insights. Students learn to identify the most appropriate quantitative and qualitative research techniques to answer particular marketing questions, design studies for maximum insight, identify and apply appropriate methods to collect and analyze data, and communicate findings to aid managerial decision making. Students gain practice conducting research, analyzing data, and reporting findings.

5251. Marketing and Digital Analytics

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 and 5182; OPIM 5103 or 5603, or BADM 5103, or BADM 5180 and 5181.

This course provides an understanding of how marketing and digital analytics can be used to gain insights and make marketing decisions. Students learn how to use analytics to discover customer needs, satisfy customer preferences, predict customer behavior, and allocate media and communication resources. Students gain hands-on experience designing, conducting, and communicating results of analytics initiatives.

5625. Marketing for Global Competitiveness

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 AND MKTG 5182.

This course provides a framework for competing in the global marketplace. Students learn how to use customer, country, and product portfolio analysis to develop effective marketing strategies in global markets. Students gain practice developing and recommending global market strategies.

5640. Integrated Marketing Communications in the Digital Age

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 AND MKTG 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.

This course provides a framework and tools to build, leverage, and enhance brand equity. Students learn to design brands and brand extensions, build brand communities, measure brand assets, and evaluate brand performance. Students gain knowledge and experience designing branding strategies.

5655. Pricing and Revenue Management

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 AND MKTG 5182.

This course provides an overview of pricing strategies and tactics to achieve revenue management goals. Students learn how to develop pricing strategies to account for temporal changes in customer demands, differences across customer segments, loyalty programs, product inventory, and price-quality relationships. Students gain experience using analytic tools for revenue management.

5660. Customer Insights

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 AND MKTG 5182.

This course provides a framework and tools to gain customer insights in B2C and B2B settings. Students learn how to evaluate internal and external influences on buyers’ information search, choice decision, and post-purchase behavior. Students gain experience using customer insights to enhance customer satisfaction, build brand loyalty, and drive word-of-mouth.

5665. Digital Marketing

Three credits. Prerequisite: MKTG 5115, or MKTG 5181 AND MKTG 5182.

This course provides a framework and tools to develop winning digital marketing strategies. Students learn how to evaluate digital marketing environments, construct and interpret digital analytics, and design social media strategies in pursuit of long and short-range marketing goals. Students gain experience analyzing and developing integrated digital marketing strategies.

5670. Marketing with Search Engines and Social Media Platforms

Three credits. Prerequisite: Open only to MBA, MSBAPM, and MS Data Science students with a Marketing Analytics concentration, others with consent.

This course provides conceptual and analytical tools for the creation, implementation, evaluation, and management of marketing campaigns on search engines and social media platforms. Students develop skills in Search Engine Optimization, bidding in online advertising auctions, creating ad campaigns under budget constraints, targeting social media users, identifying influencers, and managing user-generated content. Students gain experience estimating digital advertising ROI and conducting sentiment analysis of textual data from online content platforms.

5894. Seminar

Variable (1-6) credits. Prerequisite: MKTG 5115, or MKTG 5181 AND MKTG 5182. May be repeated for a total of 24 credits.

Investigation and discussion of special topics in marketing.

5895. Special Topics in Marketing

Variable (1-6) credits. May be repeated for a total of 24 credits.

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. Psychological Approaches to Consumer Behavior

Three credits.

This course provides an introduction to major topics in psychological approaches to consumer research. Students learn how to evaluate academic research on consumer behavior, to develop their own research ideas within the context of extant research, and to present these ideas to other researchers.

6203. Quantitative Models in Marketing

Three credits. Prerequisite: Open to Marketing Ph.D. students and other Masters/ Ph.D. students by instructor consent. May be repeated for a total of 6 credits.

This course examines empirical models in marketing. Students learn about individual and firm-level models and the use of secondary data, text analysis, and natural experiments, to predict and explain consumer and firm behavior. Students gain an understanding of model estimation issues, such as heterogeneity and endogeneity, and approaches to address these issues.

6209. Academic Research in Marketing

Three credits.

This course provides an overview of the scope of the marketing discipline and academic research in marketing. Students learn about consumer and firm perspectives in academic marketing research, theory development, research approaches and methods, and practical tools for success as a marketing scholar.

6210. Strategic Applications in Marketing

Three credits.

This course examines the role of marketing within the firm and exchanges between firms and customers. Students learn about marketing actions and their impact on firm offerings, customer relationships, and market performance. Students gain an understanding of modeling approaches and types of data used in strategic marketing models.

6211. Multivariate Analysis in Marketing

Three credits.

This course provides an overview of multivariate statistical methods in marketing. Students learn multivariate statistical techniques such as discriminant, canonical, cluster, and factor analysis; multidimensional scaling; conjoint; and logit, probit, and tobit analysis. Students gain

hands-on experience using these techniques for marketing applications.

6212. Special Topics in Consumer Behavior

Three credits. Prerequisite: Open to Marketing Ph.D. students and other Masters/ Ph.D. students by instructor consent. May be repeated for a total of 6 credits.

This course examines prominent topics in consumer research, as well as topics of faculty interest and expertise. Students gain an appreciation of current research and methods for investigating consumer behavior research questions, develop their own research ideas, and practice communicating these ideas to other scholars.

6213. Advanced Quantitative Applications in Marketing

Three credits. Prerequisite: MKTG 6203 or the equivalent as determined by the instructor.

This course focuses on advanced topics and recent developments in quantitative marketing. Students learn about advanced modeling approaches. Students gain experience using these approaches with empirical data to address marketing problems.

6296. Special Topics: Research Implementation and Progress toward General Examination

Three credits. Prerequisite: Open only to students in the Marketing doctoral program with consent of the instructor and PhD coordinator.

In this advanced course, students conduct academic research under faculty supervision to address a marketing problem and demonstrate their ability to use empirical, theoretical, and/or descriptive analytical approaches.

Materials Science and Engineering (MSE)

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. Special Topics in Materials Science and Engineering

Variable (1-3) credits. Prerequisite: Only MSE graduate students can register for this course, all others require instructor consent. May be repeated for credit.

Course taught on a provisional basis for the purposes of course development. Students may take multiple instances of MSE 5095, which all can count towards the applicable MSE graduate course credit requirements for M.S. Plan A, M.S. Plan B, M.Eng. or Ph.D. degrees, provided each instance covers a different topic.

5097. Research Methods in Materials Science and Engineering

Variable (1-3) credits. Prerequisite: Open to M.S. Plan B or M.Eng. students; major advisor approval required.

Introduction to modern methodologies of experimental or computational materials research.

A maximum of three credits can count toward the MSE graduate course credit requirements for M.S. Plan B or M.Eng. degrees. Cannot substitute for any GRAD course or be used to satisfy M.S. or Ph.D. degree credit requirements for thesis or dissertation research.

5098. Variable Topics in Materials Science and Engineering

Variable (1-3) credits. Prerequisite: Departmental consent required; may be repeated with a change in topic. May be repeated for a total of 3 credits.

Advanced or specialized topics in materials science, engineering and/or technology. A maximum of three credits can count towards the applicable MSE graduate course credit requirements for M.S. Plan A, M.S. Plan B, M.Eng. or Ph.D. degrees.

5099. Independent Study in Materials Science and Engineering

Variable (1-3) credits. Prerequisite: Major advisor consent; MSE graduate students only. May be repeated for a total of 3 credits.

Specialized non-classroom-based coursework under the regular supervision of a faculty instructor, or as offered by an accredited third party source. Does not constitute original research. A maximum of three credits can count towards the applicable MSE graduate course credit requirements for M.S. Plan A, M.S. Plan B, M.Eng. or Ph.D. degrees.

5135. Textile Structural Composite Materials

Three credits. Prerequisite: Instructor consent. Recommended preparation: MSE 5364 or ME 5430.

Provides an in-depth understanding of textile composites, their fabrication and consolidation processes, applications, characterization techniques, mechanical properties, mechanical property models and fatigue and damage tolerance properties. Focus on both 2D and 3D composites made using the textile technologies of weaving, braiding and stitching. The in-plane mechanical properties and failure mechanisms of these composites under static and fatigue loads will be examined along with their enhanced interlaminar fracture toughness, impact resistance and damage tolerance properties.

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.

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 total of 9 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 consent of instructor.

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.

5333. Imperfections in Crystalline Materials

Three credits. Prerequisite: Open only to Materials Science and Engineering graduate students.

Defects in materials: point defects, line defects, and planar defects. The origins, structure and distribution of defects in crystalline solids will be described. The influence of defects on material properties will be discussed in the context of materials science and engineering applications.

5334. Structure of Materials

Three credits.

Translation symmetry and space lattices, crystallographic computations, point and space groups, reciprocal space treatment of diffraction, and use of the International Tables for Crystallography. Chemical bonding and descriptive crystal chemistry of metals, ceramics and molecular solids. Structure of amorphous and vitreous materials and introduction to point, line and planar defects. Crystal anisotropy and relations between structure, symmetry and physical properties.

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 or 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.

5345. Degradation Mechanisms in High Temperature Materials

Three credits. Prerequisite: Instructor consent. Recommended preparation: MSE 5334.

A large number of conventional commercial alloys of common industrial interest remain prone to degradation due to corrosion and oxidation during exposure to high temperatures. While the bulk metal degradation, corrosion rates and type of corrosion products vary widely from alloy to alloy, a number of alloy formulations offer corrosion protection by forming slow growing, dense and adherent oxides. Oxidation of binary alloys will be studied with emphasis on internal and external oxidation and transition from internal oxidation to external oxidation. Oxide chemistry, morphology and metal loss of select Fe and Ni base alloys (chromia and alumina forming stainless steels and super alloys) will be analyzed and accelerated

corrosion due to carburization, sulfidation, and oxide evaporation will be discussed. Melt assisted hot corrosion of super alloys will be examined. Approaches for corrosion protection (coatings) will be presented.

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: MSE 5001 or a knowledge of Materials Science at the undergraduate level.

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.

5380. Fatigue and Fracture of Composites

Three credits. Prerequisite: Instructor consent. Recommended preparation: MSE 5364 or ME 5430.

Provides an in-depth understanding of the fatigue and fracture behavior of composite materials under both uniaxial and multiaxial loading for both unidirectional and multidirectional laminates. Focus on the characterization of these properties and the damage and failure mechanisms including the effects of constituents, loading, layup and stress concentration on the fatigue and fracture behavior. This course will also cover the basic concepts and fundamental models used to describe and predict the fatigue and fracture behavior of composites. It will also cover topics related to the impact damage tolerance of composites and the application of fracture mechanics concepts to characterize and analyze composite delamination propagation under both static and fatigue loading.

5660. New Carbon Materials

Three credits. Prerequisite: Instructor consent.

This course covers the science and technology of carbon materials and their use in automotive, aerospace, environmental protection and energy storage applications. Topics to be covered include new carbon materials, carbon material processing and applications and challenges involving the use of carbon materials in industry. This course will also introduce fundamental principles of carbon

material design and relations between carbon structure and material properties.

5700. Biomaterials and Tissue Engineering

(Also offered as BME 5700 and MEDS 5313.) Three credits. 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.

5787. Behavior of Composites

Three credits. Prerequisite: Instructor consent.

This course will cover test methods for the characterization of the mechanical and thermal properties, fatigue and fracture properties, and the nondestructive evaluation of polymer matrix composite materials. It will also cover the qualification of composite materials and the Building Block approach that is used to validate and substantiate the design of composite structures.

5801. Materials for Alternative and Renewable Energy

Three credits. Prerequisite: Instructor consent.

Composition, properties, structure and functionality of materials used in alternative and renewable energy conversion and storage. Photovoltaic solar cells, thermoelectrics, piezoelectric conversion, fuel cells, batteries, and supercapacitors will be discussed.

6401. Graduate Seminars in Materials Science and Engineering

One credit. May be repeated for a total of 14 credits.

Presentations by invited guest speakers on topics of current interest in various areas of Materials Science and Engineering. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Mathematics (MATH)

5000. Mathematical Pedagogy

One credit.

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. Open to graduate students in Mathematics, others with consent of instructor. May not be used to satisfy degree requirements in mathematics.

5005. Advanced Content Knowledge for Math Teacher Leadership

Three credits. Prerequisite: Instructor consent.

Exploration of some of the major ideas and concepts of the school mathematics curriculum from the advanced perspective of a teacher. Emphasis on mathematical reasoning and deep conceptual understanding. Main focus: Proportional reasoning as it constitutes the backbone structure for higher-level mathematical ideas, and mathematical modeling which provides a solid foundation for learning through meaningful problem solving.

5010. Topics in Analysis I

Three credits. May be repeated for credit.

Advanced topics in analysis.

5011. Topics in Analysis II

Three credits. May be repeated for credit.

Advanced topics in analysis. May be repeated for credit with a change of topic.

5016. Topics in Probability

Three credits. May be repeated for credit.

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. 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. May be repeated for credit.

Advanced topics in geometry and topology. May be repeated for credit with a change of topic.

5031. Topics in Geometry and Topology II

Three credits. May be repeated for credit.

Advanced topics in Geometry and Topology.

5040. Topics in Applied Analysis I

Three credits. May be repeated for credit.

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. May be repeated for credit.

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. Prerequisite: Not open 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. Prerequisite: Not open 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 credit.

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 a total of 12 credits.

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.

5131. Functional Analysis II

Three credits. Prerequisite: MATH 5111. May be repeated for a total of 6 credits.

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. Abstract Harmonic Analysis

Three credits. Prerequisite: MATH 5111.

Harmonic analysis on Abelian and non-Abelian locally compact groups, Pontryagin duality, the Peter-Weyl theorem, various Fourier transforms and connections to unitary representation theory.

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 total 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: MATH 5110, which may be taken concurrently.

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. May be repeated for a total 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. Prerequisite: MATH 5110 or instructor consent.

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. Prerequisite: Not open 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. Prerequisite: Not open for credit to students who have passed MATH 3435.

Solution of first and second order partial differential equations with applications to engineering and science.

5440. Partial Differential Equations

Three credits. Prerequisite: MATH 5110. Recommended preparation: MATH 5111 and 5410.

Cauchy Kowalewsky Theorem, classification of second-order equations, systems of hyperbolic equations, the wave equation, the potential equation, the heat equation in R^n .

5510. Numerical Analysis and Approximation Theory I

Three credits. Prerequisite: MATH 5110, which may be taken concurrently.

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. Prerequisite: Not open 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 MATH 5620, which may be taken concurrently. Not open 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. Prerequisite: 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. Prerequisite: 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

Four credits. Prerequisite: Not open 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. Recommended preparation: MATH 5670.

Data structures and algorithms; regression; classification; clustering; recommender systems; anomaly detection; Big Data tools; databases.

5698. Topics in Actuarial Science

Three credits. Prerequisite: Open to graduate students only. May be repeated for credit.

Advanced topics in Actuarial Science.

5788. Variable Topics

Three credits. May be repeated for credit.

Prerequisites and recommended preparation vary. With a change in content, may be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5789. Independent Study

Variable (1-6) credits. May be repeated for a total of 6 credits.

With a change in content, may be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5798. Variable Topics

Three credits. May be repeated for credit.

Prerequisites and recommended preparation vary. With a change in content, may be repeated for credit.

5799. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

With a change in content, may be repeated for credit.

5800. Investigation of Special Topics

Variable (1-6) credits. May be repeated for credit.

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. May be repeated for a total of 6 credits.

Participation in internship and paper describing experiences. May be repeated for a total of six credits.

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 total 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).

Mechanical Engineering (ME)

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.

5215. Underwater Sensor Systems Analysis and Design

Three credits. Prerequisite: Undergraduate courses in Calculus Based Physics; MATLAB or equivalent for computer simulations; or Underwater Acoustics and Sensing Systems.

The Underwater Sensor Systems Analysis and Design course explores the analysis and synthesis of underwater sensing and communication systems. The intended applications of these systems and the factors that affects their performances in various environmental conditions. Size, weight, and cost provide the constraints to achieve the optimized (or compromised) design.

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 Fluid Dynamics

Three credits. Prerequisite: Instructor consent.

An introduction to the fundamentals of computational fluid dynamics (CFD) including thermal transport. Introduces the main computational techniques and methods and analyze their properties. Strong emphasis will be given to the implementation and application of computational techniques and methods. The course is not training on how to use commercial CFD software, and we do not use or discuss such software in the class. The course serves the needs of students that conduct CFD-related research or students who want to develop an in-depth understanding of the subject to critically assess the results CFD software.

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.

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: Instructor consent.

Provides students with the fundamental knowledge to perform stress analysis of fiber-reinforced composite materials. The focus is on the use of mechanics to study the stresses due to applied deformations, loads, and temperature changes. This course begins with an introduction to composite materials including their constituent properties, applications, advantages and limitations, and manufacturing techniques. The generalized

Hooke's Law for anisotropic solids is along with the Classical Lamination Plate Theory (CLPT) is introduced for composite laminates. Students will learn how to apply CLPT to the failure analysis of composite laminates under combined mechanical and thermal loads. The course concludes with the study of interlaminar stresses and the analysis of composite laminated beams.

5431. Fatigue in Mechanical Design

Three credits. Prerequisite: Not open 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.

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.

5442. Composites Design

Three credits. Prerequisite: ME 5430 or MSE 5364.

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.

5443. Composites Manufacturing

(Also offered as MFGE 5220.) 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.

5512. Introduction to Structural Optimization

Three credits. Recommended preparation: Previous knowledge in principles of optimum design and in finite element analysis.

Application of mathematical optimization techniques to the design of structures modeled via the finite element method, including size, shape and topology optimization. Mathematical derivation and computational implementation aspects of material and shape sensitivities used for shape and topology optimization, including direct and adjoint sensitivity analysis, and finite difference sensitivities. Size optimization of discrete systems and of distributed parameter systems. Optimization techniques for structural optimization, including fully-stressed design, optimality criterion methods and gradient-based nonlinear programming methods. Topology optimization of discrete systems and of continua, including density-based and level-set-based methods. Shape optimization techniques.

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.

5515. Introduction to Hands-On Finite Element Analysis

Three credits. Prerequisite: CE 2110 or 3110 or equivalent.

This course introduces the basic theory of finite element analysis (FEA) and the use of ANSYS® Workbench in the modeling and simulation of engineering problems. It uses simple mechanics problems as examples and focuses on the application of one-dimensional bar and beam elements, two-dimensional plane stress and plane strain elements, plate and shell elements, and three-dimensional solid elements in the analysis of engineering structures. It covers the application of FEA to the analysis of mechanical stresses, vibrations, dynamics, thermal effects, and failure. In each of these application areas, ANSYS® Workbench is introduced through hands-on case studies. Clear understanding of the FEA principles, element behaviors, solution procedures, and correct usage of the FEA software is emphasized throughout the course.

5520. Finite Element Methods in Applied Mechanics I

(Also offered as CE 5164.) Three credits. Prerequisite: 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. Prerequisite: Not open to students who have passed ME 5521.

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.

5522. Advanced Analysis of Composite Materials and Structures

Three credits. Prerequisite: Instructor consent. Recommended preparation: undergraduate degree in mechanical engineering or similar discipline.

Advanced course in composite materials analysis that focuses on micromechanics analysis, failure prediction and hygrothermal effects. It will provide students with the skills to perform elasticity-based micromechanics analysis of composite thermal and mechanical properties and failure. Students will also learn about the analysis of discontinuous fiber composites. The analysis of the effects of temperature and moisture on multidirectional composite laminate properties and constitutive behavior will be covered along with the analysis of processing-induced residual stresses and laminate deformation. Students will work on a project that applies the skills learnt in the course to a practical composite application.

5702. Data Science for Materials and Manufacturing

(Also offered as SE 5702 and MFGE 5210.) Three credits. Prerequisite: Undergraduate degree in engineering or computer science, departmental or unit consent required. Recommended preparation: Knowledge or coursework in probability and statistics. Ability to read, interpret and modify Python and MATLAB code. Ability to use Python and MATLAB for analyzing data for the course project.

This course will provide students with data analytics skills for knowledge discovery and design optimization. The students will also learn how to apply data mining and machine learning techniques to tackle the challenges in manufacturing and computational materials engineering. Topics include basic concepts of supervised/unsupervised learning, design of experiments and data collection, material image processing, surrogate modeling, optimization and model calibration, multi-fidelity modeling, and applications of data analytics in manufacturing and computational materials engineering problems.

5895. Special Topics in Mechanical Engineering

Variable (1-3) 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. 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.

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. 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.

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. May be repeated.

Presentations by invited guest speakers on topics of current interest in various Mechanical Engineering and allied fields. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6511. Advanced Optimum Design

Three credits. Prerequisite: ME 5511 or MATH 3410.

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.

Medical Science (MEDS)

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.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5313. Biomaterials and Tissue Engineering

(Also offered as BME 5700 and MSE 5700.) Three credits. 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.

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.

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

Four credits.

This course will first introduce the basic components that comprise the immune system, and then explore how the immune system impacts health and disease.

5335. Advanced Molecular and Cellular Immunology I

Four credits.

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.

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.

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.

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. May be repeated for a total of 4 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.

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.

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 eucaryotic 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.

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 4 credits.

Combination lecture and literature discussion course with a focus 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 MEDS 5327 or MEDS 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.

5420. Molecular Genomics Practicum

Three credits. Prerequisite: Instructor consent.

Coupling classical molecular biology techniques to high throughput sequencing for nucleic acid detection has revolutionized how scientists study biology. Students will be introduced to the command line and gradually build upon concepts and skills so that they will be capable of building workflows to process and analyse high throughput sequencing data. After basic concepts and command line competency are established, the course will focus on the analysis of ChIP-seq, RNA-seq, and ATAC-seq data. Students will learn to use many common genomics software packages to perform such tasks as genome alignment, peak calling, motif analysis, and differential expression analysis. Students will be introduced to the statistical computing language R and perform analyses and visualization using an R interface.

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.

This course serves to expand upon and integrate basic science concepts introduced in the Human Systems. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6405. Correlated Medical Problem Solving - Part B

Two credits.

Expands upon and integrates basic science concepts introduced in the Human Systems course. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6406. Human Development and Health

Variable (1-2) credits. May be repeated for a total of 2 credits.

The HDH course has been taken by combined M.D./Ph.D. 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 one credit in each of the first two years. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6407. Mechanisms of Disease: Part A

Four credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6408. Mechanisms of Disease: Part B

Six credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6411. Clinical Practicum

12 credits. May be repeated for a total of 24 credits.

Clinical experience in the major disciplines including: Medicine, Surgery, Obstetrics and Gynecology, Psychiatry, Family Medicine, and Pediatrics. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6412. Advanced Clinical Practicum

11 credits.

Advanced clinical work with opportunities in the major clinical disciplines. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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.

Expands upon and integrates basic science concepts introduced in Human Development and Health and Mechanisms of Disease. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6417. Advanced Correlated Medical Problem Solving - Part B

Two credits.

Expands upon and integrates basic science concepts introduced in Human Development and Health and Mechanisms of Disease. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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.

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.

Through a series of lectures and workshops, this course is 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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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. 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.

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.

A 38-week long medical school course taken in the first year of the combined M.D./Ph.D. 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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6457. Human Systems B

Six credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6461. Clinical Radiation Sciences: Physics and Biology (Part A)

Two credits.

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.

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 Ph.D. in Biomedical Sciences. Also available to individuals in Master's or Ph.D. 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 a total of 24 credits.

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 a total of 24 credits.

6497. Graduate Seminar

Variable (1-6) credits. May be repeated for a total of 24 credits.

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 a total of 16 credits.

6501. Communications for Biomedical Scientists

One credit. Prerequisite: Instructor consent, open only to students in the Biomedical Science Field of Study.

This course is designed to introduce or reinforce biomedical science graduate students to some basic concepts in written and oral communication. The majority of the class will focus on writing as a fundamental skill for a variety of career options in the biomedical science field. The course will be comprised of interactive sessions on storytelling, basic sentence and paragraph composition skills, specific science-related writing including grants and manuscripts and effective oral presentation of scientific research. The different sections will involve lecturing as well as in-class and out-of-class writing exercises. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6502. Experimental Design, Rigor and Biostatistics

One credit. Prerequisite: Open only to second-year students in the Biomedical Sciences Ph.D. program.

This course is designed to provide a general overview of the key components required for conducting rigorous and reproducible biomedical research. Experimental design, reagent authentication, biostatistics and other related topics will be covered with an emphasis on how they each contribute to the overarching goal of establishing rigor. The biostatistics section will cover commonly used analyses, with an emphasis on determining the most appropriate analysis for particular data sets. Additionally, considerations in analyzing human clinical versus animal-based research will be discussed, and statistical approaches such as meta-analysis and bioinformatics will be introduced to familiarize students with these techniques so that they can more effectively read and critique current scientific literature.

6503. First Year Graduate Experience in Biomedical Science

Two credits. Prerequisite: Open only to first year students in the Biomedical Science Ph.D. program. May be repeated for a total of 4 credits.

This course is structured as four blocks, which are completed in two semesters. The course will begin a 7-week exploration block in which first-year students are introduced to the research themes in each area of concentration (AOC) of Biomedical Science. Students will attend activities and research presentations given by each AOC, meet with faculty who can serve as research rotation instructors, and attend a weekly graduate seminar. In each of the subsequent 3 blocks (one in the fall semester and two in the spring semester), students will perform a research rotation under the direction of faculty instructor and attend a weekly graduate seminar that aligns with the rotation instructor's primary AOC. Each student will present a rapid-fire talk (5 minutes) on their research topic at the end of each rotation block. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6504. The Genetics of Model Organisms

Three credits.

The course is required for all students in the Genetics and Developmental Biology area of concentration and all students supported by the UConn/JAX Training Program in Genomic Science T32, although any other students in the Biomedical Sciences Graduate Program are welcome to enroll. The course is designed to provide students an in-depth overview of modern genetic approaches to studying biology. Genetics is a powerful and variable approach to dissect gene and organismal function. Through time, increasingly specific and sophisticated genetic approaches have been developed that further increase the power of genetics to studying biology. The course will investigate the full breadth of experimental paradigms for genetic analysis in six model genetic organisms (*S. cerevisiae*, *Drosophila melanogaster*, *C. elegans*, Zebrafish, mouse and human) through a structured series of lectures with a focus on the primary research literature. A series of research paper discussions will also be integrated with the lectures. In addition, the final session in each module will be a detailed discussion of a classical genetic paper using the organisms discussed in that module.

Molecular and Cell Biology (MCB)

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.

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. Prerequisite: Not open for credit to students who have passed MCB 3003.

An introduction to the physical chemistry of biological molecules and systems. Principal topics include biomolecular thermodynamics, kinetics, transport properties, and biomolecular structure.

5004. Biophysical Chemistry II

Three credits. Prerequisite: Not open for credit to students who have passed MCB 3004.

The physical chemistry of biological molecules and systems. This course will emphasize a statistical framework for understanding biomolecular phenomena. Principal topics will include electrostatics, intermolecular forces, ligand binding, and protein stability and folding.

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. Prerequisite: 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 to graduate students in Molecular and Cell Biology, others with permission. 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.

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

Two credits. May be repeated for a total of 8 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.

5077. Practicum in NMR Spectroscopy

One credit. Prerequisite: Instructor consent required. Recommended Preparation: MCB 5076 or MCB 2000 or MCB 3010.

Hands-on training in heteronuclear NMR spectroscopy of biomolecules. Topics include protein folding, protein dynamics, binding of ligands to proteins, and protein structure determination.

5080. Frontiers in Microbiology

One credit. May be repeated for a total of 5 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.

5084. Current Topics in Biochemistry and Structural Biology

One credit. May be repeated for a total of 3 credits.

Reading and discussion of papers from the recent literature. Topics include advances in structural, biochemical, and biophysical technologies, macromolecular interactions and structure-function relationships, drug development and discovery, protein folding, and virology. 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.

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.

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: Not open 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 to graduate students in Molecular and Cell Biology, others with permission. 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. May be repeated for a total of 8 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.

5284. Current Topics in Cell and Developmental Biology

One credit. May be repeated for a total of 6 credits.

Reading and discussion of papers from the recent literature. Topics include cytoskeletal function, cell motility, gene expression, and signal transduction, with special focus on their relationship to development, host-pathogen interactions, the immune system, and cancer. 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).

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. May be repeated for a total of 7 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. May be repeated for a total of 8 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. 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. 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 8 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 4 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. May be repeated for a total of 4 credits. Current topics in genomics research including ethics, impacts on society, and applications in academic and industrial settings.

5484. Current Topics in Genetics and Genomics

One credit. May be repeated for a total of 6 credits. Reading and discussion of papers from the recent literature. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5490. Industrial Insights

Variable (1-2) credits. 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 graduate students in the MCB Professional Science Masters programs. May be repeated for credit. Speakers from industry, government agencies, universities and non-profits provide advice about career paths, business models, hiring and employment opportunities. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5616. Experiments in Bacterial Genetics

Three credits. 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. 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.

5625. Horizontal Gene Transfer, From Mechanisms to Outcomes

Three credits. Prerequisite: Instructor consent; not open to students who have passed MCB 5895 when offered as Horizontal Gene Transfer in Prokaryotes. How quorum sensing, natural transformation and biofilm formation collectively control and bias horizontal gene transfer (HGT) in prokaryotes. The contribution of HGT to prokaryotic evolution via, for example, adaption to environments, generation of metabolic pathways, and how separate lineages are formed.

5631. Sequence-based Microbial Community Analysis

Three credits. Prerequisite: MCB graduate students only. Overview of current computational methods for analyzing sequence-based microbial community data including amplicon-based, shotgun metagenomics and metatranscriptomics methods. Students will analyze published data or their own datasets.

5670. Theory and Practice of Laboratory Techniques in Microbiology

Variable (1-2) credits. May be repeated for a total of 5 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. 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. 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. Topics in microbial cell organization, growth, and intermediary metabolism with emphasis on specialized physiological adaptations.

5681. Mechanisms of Bacterial Pathogenicity

Three credits.

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.

Discussion of current topics in microbiology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5799. Independent Study

One credit. Prerequisite: Instructor consent. May be repeated for a total of 4 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. May be repeated for a total of four credits.

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.

5884. MCB Research in Progress

One credit. May be repeated for a total of 3 credits.

Presentations by graduate students, post-doctoral fellows, and other MCB personnel focusing on their current research projects. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5895. Special Topics in Molecular and Cell Biology

Variable (1-4) credits. May be repeated for a total of 24 credits.

Advanced study in a field within Molecular and Cell Biology. Credits and hours by arrangement. Prerequisites and recommended preparation vary.

5900. Professional Writing and Communication Skills

One credit. Prerequisite: Open only to Molecular and Cell Biology and Mathematics Professional Science Master's (PSM) students and Molecular and Cell Biology Professional Master's (PM) students.

Professional communication skills focused on jobs in industry. Hands-on practice in writing resumes and interviewing.

5910. Responsible Conduct in Research

One credit. Prerequisite: Open to graduate students in Molecular and Cell Biology.

Core principles pertaining to responsible conduct in research are covered through case studies, readings and classroom instruction. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5984. MCB Invited Seminar

One credit. May be repeated for a total of 3 credits.

Selected topics in cellular and molecular biology presented by invited speakers. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6000. Rotations in MCB Laboratories

Three credits. Prerequisite: Open only to Molecular and Cell Biology Ph.D. students.

Provides entering Ph.D. students with research experience in three different laboratory settings during the first semester of graduate studies to assist with the selection of a mentor 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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6001. Introduction to Molecular and Cell Biology Research

Three credits. Prerequisite: Instructor consent; open to Ph.D. and thesis M.S. students in Molecular and Cell Biology.

Introduction to general areas of research for Ph.D. students in Molecular and Cell Biology; includes specific laboratory research opportunities, laboratory skills and professional development.

6002. MCB Faculty Research

One credit. Prerequisite: Open to Thesis M.S. and Ph.D. students in Molecular and Cell Biology.

Department faculty present seminars describing their research interests to help incoming Molecular and Cell Biology Ph.D. graduate students choose laboratories for rotations. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6897. Research

Variable (1-6) credits. 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 to graduate students in Music, others with permission. May be repeated for a total of 20 credits.

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 to graduate students in Music, others with permission. May be repeated for a total of 16 credits.

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 to graduate students in Music, others with permission. May be repeated for a total of 12 credits.

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.

5307. Instrumental Literature and Performance

Three credits. Prerequisite: MUSI 5391; open to graduate students in Music, others with permission.

Foundational solo, chamber, and ensemble repertoire. Taught with MUSI 3234.

5308. Choral Literature

Two credits. Prerequisite: Open to graduate students in Music, others with permission. May be repeated for a total of 8 credits.

Historical-analytical study of choral compositions. Formerly offered as MUSI 5365.

5309. Seminar in Woodwind Literature

Three credits. Prerequisite: Open to graduate students in Music, others with permission.

Historical development of the woodwind instruments; of representative solo and ensemble literature.

5319. Notation and Performance Practice

Three credits. Prerequisite: Open to graduate students in Music, others with permission.

Notation, ornamentation, and instrumentation from the middle ages through the classic period.

5323. Applied Music

Variable (1-7) credits. Prerequisite: Open to graduate students in Music, others with permission. May be repeated for credit.

The Applied Music Fee fee is charged all students receiving private instrumental, vocal, or conducting instruction.

5324. Graduate Chamber Ensemble

One credit. Prerequisite: Open to graduate students in Music, others with permission. May be repeated for a total of 8 credits.

Study and performance of chamber music for various ensembles.

5325. Opera Theater

One credit. Prerequisite: Open to graduate students in Music, others with permission. May be repeated for a total of 8 credits.

Study and performance of roles in major opera productions and/or work in production technique.

5330. Advanced Instrumental Conducting

Two credits. Prerequisite: Open to graduate students in Music, others with permission. May be repeated for a total of 8 credits.

Score study, conducting, and rehearsal techniques of selected instrumental literature.

5331. Conducting Seminar

One credit. May be repeated for a total of 6 credits.

Special topics in instrumental and choral conducting.

5341. Instrumental Pedagogy

Three credits. Prerequisite: MUSI 5391; open to graduate students in Music, others with permission.

Philosophy, methodology, and practical application of pedagogical techniques for applied music instruction. Taught with MUSI 3233.

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 graduate students in Music, 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 graduate students in Music, others with consent. May be repeated for a total of 9 credits.

Analysis of specific styles and the work of particular theorists: variable topics. With a change of content, this course may be repeated to maximum of nine credits.

5354. Advanced Analysis

Three credits. Prerequisite: MUSI 5302; open to graduate students in Music, 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 to graduate students in Music, others with permission. May be repeated for a total of 8 credits.

Score study, conducting, and rehearsal techniques of selected choral literature.

5366. Choral Literature from 1600 to 1800

Two credits. Prerequisite: Open to graduate students in Music, others with permission.

Historical-analytical study of choral compositions: 1600 to 1800.

5367. Choral Literature from 1800 to Present

Two credits. Prerequisite: Open to graduate students in Music, others with permission.

Historical-analytical study of 1800 to the present.

5372. Wind Band Literature

Three credits. Prerequisite: Open to graduate students in Music, others with permission. May be repeated for a total of 12 credits.

Historical-analytical study of music for wind ensemble and symphony band.

5373. Orchestra Literature

Three credits. Prerequisite: Open to graduate students in Music, others with permission.

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 4 credits.

6400. Tutorial in Music

Variable (1-3) credits. 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 to graduate students in Music, others with permission. May be repeated for a total of 18 credits.

6412. Seminar: Style Periods in Music History

Three credits. Prerequisite: Open to graduate students in Music, others with permission. May be repeated for a total of 12 credits.

6413. Seminar: History of Musical Forms

Three credits. Prerequisite: Open to graduate students in Music, others with permission. May be repeated for a total of 18 credits.

Sonata, concerto, madrigal, motet or other musical forms.

6491. Seminar: Advanced Research Procedures in Musicology

Three credits. Prerequisite: Open to graduate students in Music, others with permission.

Critical reading and original research in recent historical musicology.

Natural Resources and the Environment (NRE)

5115. Field Methods in Hydrogeology

Three credits. Prerequisite: Not open to students who have passed EARTH 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.

5150. Ecosystem Science and Management

Three credits. Prerequisite: This course and NRE 4150 may not both be taken for credit.

Ecosystem biogeochemical processes, the organism-environment interactions that regulate them, and natural resources management strategies that explicitly consider ecosystem structure and function.

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 to students who have passed EARTH 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. Regional Climate Modeling

Three credits. Recommended preparation: Undergraduate calculus I and 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.

5180. Climate Change Adaptation Science

Three credits.

An overview of climate change adaptation science including knowledge, principles, and applications of adaptation practices, technologies, tools, and strategies. Topics include the scientific evidence of anthropogenic climate change, climate change impacts on our lives and society, two-way relationships between climate change and humans, and multiple approaches applied in adaptation across diverse sectors (agriculture, forestry, fisheries, etc.) from local to regional and global scales. Emphasis on the fundamental concepts of climate change adaptation science, different disciplinary perspectives and interconnections, and its effectiveness, limitations, and future needs.

5200. Sustainable Natural Resources Management

Three credits.

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.

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.

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. Introduction to Geospatial Analysis with Remote Sensing

Three credits.

Introduction to collecting, managing, displaying, and analyzing geospatial data. Topics include coordinate systems, finding and using existing sources of geospatial data, analysis of vector and raster data, creating geospatial data with remote sensing, concepts of Global Positioning System (GPS), topographic and landscape analyses, and spatial interpolation.

5220. Environmental Planning for Sustainable Communities and Regions

Three credits.

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.

5225. Sustainable Use of Ocean Resources

Three credits. Prerequisite: Department consent.

Introduction to the marine environment and associated environmental, social, and economic issues. Topics include marine ecology and ecosystem services, human drivers of change and trends related to the ocean, ocean-based industries and activities, coastal and marine pollution, ocean policy and law, sustainable use of living marine resources, and ecosystem management strategies to aid conservation efforts.

5230. Sustainability Leadership in Organizations

Three credits.

Organizational leadership strategies for adopting sustainability practices to develop a culture of sustainability and a commitment to advancing environmental, social, and economic benefits for multiple stakeholders, (e.g., employees, partners, society, and the environment). Viewed through an interdisciplinary lens, students will examine challenges and opportunities that organizations face in various sectors, covering topics such as pollution prevention, circular economy, “triple bottom line,” “greening” the supply chain, UN SDGs, key performance indicators (e.g., customer satisfaction, return on investment), and assessment of progress toward achieving sustainability goals, among other topics. Case studies and practical applications will be emphasized.

5252. Physiology and Ecology of Trees

Three credits.

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.

5255. Water Quality Management

Three credits. Recommended preparation: NRE 3125. Not open for credit to students who have passed NRE 4255.

An introduction to all aspects of water quality problems relating to the many beneficial uses of water, including the physical, chemical, and biological properties. Taught with NRE 4255.

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

Three credits. Prerequisite: Instructor consent. Not open for credit to students who have passed NRE 4205.

A broad overview of stream ecology will be presented. Topics covered will include stream habitats and the diversity of organisms which inhabit them, adaptations to life in running water, and energy flow and nutrient cycling in stream ecosystems. Efforts targeted at the conservation of streams will be integrated throughout the semester. One or more field trips required. Instructor consent required. Taught with NRE 4205.

5340. Ecotoxicology

Three credits. Recommended preparation: prior coursework in ecology or environmental biology, and environmental chemistry.

Introduction to the current state of environmental toxicology knowledge and research. Relevant concepts in ecosystem science, toxicology, and public health are taught within the framing of historic and current case studies of environmental contamination problems. Term paper and presentation are required.

5370. Population Dynamics

Three credits. Recommended preparation: STAT 1100Q, MATH 1060Q or higher, and NRE 3345.

How population dynamics models are used in science and in the management of fish and wildlife populations, factors influencing population dynamics. Design, evaluation, and use of a population model. Students will complete activities in the R scripting language. Taught concurrently with NRE 4370.

5390. Advanced Wetland Ecology

Three credits. Prerequisite: Instructor consent required. Recommended preparation: prior coursework in ecology and wetland science.

The current state of wetlands research and field methods used to quantify wetland vegetation, hydrology, and soils. Discussions of the primary literature will be complemented by field trips to a variety of wetlands to implement field techniques and explore wetland natural history, classification, biogeochemistry, and responses to anthropogenic stressors.

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.

5525. Remote Sensing of the Environment

Three credits. Prerequisite: Instructor consent.

Introduction to remote sensing theory and practice. Includes electromagnetic radiation, spectral reflectance, earth observation platforms and sensors, image processing methods, and multidisciplinary applications.

5535. Remote Sensing Image Processing

Three credits. Prerequisite: A course in remote sensing of the environment.

A variety of related topics that include the physical processes involved in remote sensing and various image processing methods. The labs will be primarily focused on how to use image processing software (e.g., ENVI) to analyze satellite imagery.

5545. Quantitative Remote Sensing Methods

Three credits. Prerequisite: A course in remote sensing image processing.

Quantitative remote sensing methods for solving real-world problems, and methods for quantitative analysis of remotely sensed imagery plus various remote sensing applications.

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.

5560. High Resolution Remote Sensing: Applications of UAS and LiDAR

Three credits.

Introduction to high-resolution remote sensing data and collection platforms. The first half of the course focuses on unmanned aerial systems (UAS) including operations, data collection, and post-processing of acquired data. Topics include laws, safety, and ethical considerations; mission planning, sensor selection, and photogrammetric processing of the collected data in commercial software. The second half of the course focuses on the fundamentals of light detection and ranging (LiDAR) and applications of LiDAR in mapping and environmental analysis. Topics include LiDAR point-cloud visualization and interpretation, creation of digital elevation and surface models, and feature extraction using ArcGIS and LAS Tools.

5575. Natural Resource Applications of Geographic Information Systems

Four credits. Prerequisite: Not open 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. Python Scripting for Geospatial Analysis

Three credits. Prerequisite: Instructor consent. Recommended preparation: NRE 5215 or equivalent.

GIS scripting techniques in Python for geospatial analyses, enabling students to pursue integrated

research in earth resources data geoprocessing applications.

5605. Environmental Data Analysis

Three credits. Recommended preparation: a course in introductory linear algebra and introductory statistics.

Develop proficiency in fundamental data analytic techniques in the R scripting language commonly used in environmental science and engineering with applications spanning practice and research. Topics include: trend detection, numerical approaches to model fitting, cluster analysis, and introductory machine learning methods.

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 4 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 6 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 6 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. May be repeated for a total of 18 credits.

5800. Graduate Seminar

One credit. May be repeated for a total of 4 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5830. Internship in Energy and Environmental Management

Three credits. Prerequisite: NRE 5200, 5220, or LAW 7812; open to majors or non-degree students in the Master of Energy and Environmental Management program, instructor consent required.

Integrate core concepts of the Energy and Environmental Management program with planned and supervised experience in the public or private sector. Students complete an internship or research project that applies knowledge and skills, gains professional experience, and builds networks with prospective employers.

5850. Practicum in Energy and Environmental Management

Three credits. Prerequisite: NRE 5200, 5220 and LAW 7812; instructor consent required.

Application and synthesis of core concepts of the Energy and Environmental Management program with project-based work in student's area of emphasis.

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. Recommended preparation: A general familiarity with R scripting.

Students will develop proficiency in fundamental modeling principles used to describe watershed hydrology and various associated ecosystem functions. Topics include ecohydrology focusing on catchment water and energy balances, hydrologic modeling (potential evapotranspiration, snow accumulation and melt, soil moisture, plant growth, surface runoff), forest-water modeling, introduction to model sensitivity and calibration techniques, application of tracers in ecohydrology, issues in parameterized hydrologic model climate-transferability, and basic R scripting.

6175. Ground Water Modeling Applications

Three credits. Prerequisite: Not open to students who have passed EARTH 5720.

Application of Modflow to ground water flow and contaminant problems. Well head protection modeling.

6450. Teaching Practicum

Three credits. May be repeated for a total of 6 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6500. Grant Proposal Writing

Two credits. Recommended preparation: NRE 6000.

Designed for Ph.D. students in natural resource and associated environmental fields. Provides students with experience in individual and collaborative grant and funded-project proposal writing. Students will gain an overview of federal, state, and private funding organizations, and familiarity with the proposal review process. By the end of the course, students will have developed a draft grant or funded-project proposal targeted to a current request for research proposal (RFP/RFA) or other ongoing funding program relevant to their disciplinary expertise.

Nursing (NURS)

5000. Investigation of Special Topics

Variable (1-6) credits. May be repeated for a total of 6 credits.

5001. Holistic Nursing Part 1: Basic Concepts

Three credits. Prerequisite: Open to Nursing graduate and certificate students; open to non-degree students who hold a bachelor's degree and RN 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 to students in Nursing graduate degree and certificate programs.

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: NURS Grad Majors; open to graduate students in other disciplines with instructor 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 Clinical Scholarship

Three credits. Prerequisite: Prerequisite or corequisite: NURS 5012 and 5020.

This course focuses on the generation and dissemination of nursing knowledge to improve the health of individuals, address health inequities across populations, and transform health care. Within the evidence hierarchy, emphasis is placed on nurses' identification of research questions and appropriate study designs using rigorous quantitative and qualitative methods, and dissemination of research findings through poster and podium presentations.

5035. Evidence-based Practice to Advance Clinical Scholarship

Three credits. Prerequisite: Prerequisite or corequisite: NURS 5020 and 5030.

The focus of this course includes use of evidence-based practice (EBP) processes for individual patient management aligned with advanced nursing practice expectations and Standard of Care. Emphasis is on clinical problem identification, accessing, analyzing, and applying primary and select secondary source literature and clinical practice guideline findings to facilitate quality, safe, and individual patient care management.

5060. Advanced Pathophysiology: Concepts for Advanced Nursing Practice Across the Lifespan

Three credits. Prerequisite: Not open for credit to students who have passed NURS 5362 or 5369.

This course is 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: NURS 5060, which may be taken concurrently; open only to Nursing graduate students, others with consent.

The purpose of this course is to provide students with an advanced level of skill in attaining the health history, physical examination and knowledge in critical thinking and diagnostic reasoning. The focus is on conducting comprehensive and problem focused health assessments and planning care for patients across the lifespan. The emphasis of this course is on the integration of critical thinking, scientific ethics, human diversity, as well as the recognition of social issues in the care of and presentation of patients.

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 which must be tolerated, and on client teaching indicated by pharmacotherapy.

5095. Individualized Study

Variable (1-6) credits.

Description will vary depending on the needs/goals for each occurrence. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5098. Independent Study

Variable (1-6) credits. May be repeated for a total of 24 credits.

5101. Fundamental Mechanisms of Acute and Chronic Pain

Three credits. Recommended Preparation: Background in nursing or other healthcare-related training recommended but not required.

An exploration of physiological processes involved in pain transmission as well as the psychological, emotional, and cognitive processes that modulate pain perception based on the current literature using both human and nonhuman animal pain models.

5102. Basic and Clinical Pain Research

Three credits. Recommended Preparation: Background in nursing or other healthcare-related training recommended but not required.

Review of leading edge methods used to quantify and study pain in both human and nonhuman animal pain models.

5103. Pharmacology of Pain and Analgesia

Three credits. Recommended Preparation: Background in nursing or other health or allied health training recommended but not required.

This course reviews processes underlying functional and pathological pain states, exploring the effects and limitations of pharmacotherapies currently used to treat pain. Particular emphases placed on the concept of individualized care and non-opioid pain interventions.

5104. Pain Assessment and Management

Three credits. Prerequisite: Background in nursing or other healthcare-related training recommended but not required.

This seminar-based course is comprised of seminars by clinicians and pain scientists to evaluate, integrate, and translate findings from primary literature into evidence-based practice.

5105. Alzheimer's and Dementia: Disease Trajectory and Management

Three credits. Prerequisite: Instructor consent.

Introduction to the disease process of several types of Dementia. This will be the first in a series of three courses. The course will begin with an effort to describe the pathophysiology, diagnostic testing, current treatments, and current clinical trials of Alzheimer's disease, Frontotemporal Lobe Dementia, Lewy Body/Parkinson's Disease Dementia, Young Onset Dementia, Vascular Dementia, Down's Syndrome and Dementia, Creutzfeldt-Jakob Disease, Huntington's Disease, Korsakoff Syndrome, Mixed Dementia, and Mild

Cognitive Impairment. Students should be able to compare and contrast the pathophysiology, treatment, and symptom presentation of each dementia type as well as a public health approach to dementia.

5106. Dementia Caregivers and Families

Four credits. Prerequisite: Instructor consent.

This course will follow the Alzheimer's and Dementia course. In this course, students will learn how to use the principles of the first course to identify opportunities to guide caregivers and families of persons with dementia using family centered care. This course will emphasize the critical thinking and problem solving needed to assess caregiver needs at each stage of the disease process, education needed by caregivers, legal and ethical issues, as well as palliative and end of life care.

5107. Behaviors and Communication

Four credits. Prerequisite: Instructor consent.

Introduction to common behaviors seen in dementias and will include designing activities for dementia patients, alternative therapies. Students will participate in virtual simulations, and case studies around effective communication, effective communication as it relates to challenging behaviors, as well as pain assessment. Through this course, students will learn the importance of quality care in decreasing anxiety in persons with dementia that may lead to challenging behaviors.

5108. Contemporary Foundations of Dementia

One credit. Prerequisite: Bachelors degree in a health profession field. Instructor consent required. NURS 5105, 5106, and 5107 may be taken concurrently.

This course will address two common types of dementia (Mild Cognitive Impairment and Alzheimer's Disease) and prepare nurses and other healthcare professionals on essential knowledge to assess, treat and care for patients with these diseases, as well as expand knowledge of the public health crisis dementia is in America.

5111. Healthcare Innovation Theory and Application

Three credits. Prerequisite: Open only to students in the Healthcare Innovation Certificate program.

Introduction to innovation as a concept, leading theories and applications to healthcare. First in a series of four courses for the Healthcare Innovation certificate program. Defines the concept of innovation within the first week, exposes students to leading innovation theorists (e.g., Christensen, Drucker, Rogers and von Hippel). Each theorist has a different approach and perspective on innovation. Students should be able to compare and contrast the key theorists, their perspectives and identify real life situations (e.g., case studies) that can be supported (and not supported) by the concepts within these theories. While these theorists are not healthcare professionals, their theories have been used to explain phenomenon in the healthcare industry. Beyond the theoretical and conceptual understanding of innovation, students will demonstrate an understanding of how to apply these theories to real life use cases. Emphasizes the relationship between innovation and evidence-based practice.

5112. Healthcare Opportunities for System Level Solutions

Three credits. Prerequisite: NURS 5111 or instructor consent.

Use of principles identified in NURS 5111 to identify opportunities in health care (e.g., problems to be solved). Nurses and healthcare professionals work around problems every day. Yet, rarely are these workarounds viewed as system level opportunities for improvements. Emphasize the critical thinking and creativity needed to identify a problem, and instead of determining how to solve for one, focus on how one might be able to solve for the many. By the end of this course, students should feel confident in their ability to recognize opportunities and begin to move toward a system (e.g., organizational) level thinking instead of an individual level thinking. Focus on the individual as the innovator.

5113. Developing and Leading a Sustainable Culture of Healthcare Innovation

Three credits. Prerequisite: NURS 5111 or instructor consent.

Introduction to the essential concepts of organizational change, leadership, and project management necessary to build and foster a culture of healthcare innovation. To innovate, one must also have an environment that allows innovation to grow and flourish. While we do need individuals to know how to think and act innovatively, we also need leaders who can embrace these behaviors and build a culture that supports such efforts. Traditionally, our healthcare environments have tended to reward "we've always done it this way" behaviors and stunt those who identify opportunities for improvement as disruptive. Students will learn the importance of effective leadership with any organizational change. Project management is an essential skill for any leader in healthcare and especially that of new changes being introduced to an environment.

5114. Health Care Innovation Development

Three credits. Prerequisite: NURS 5111, NURS 5112, and NURS 5113 or instructor consent.

The last of four courses in the Healthcare Innovation certificate program. Serves as the capstone course for enrolled students. Students will need to identify a problem in the healthcare industry and propose a solution to that problem. Through the course of the semester, the student will have weekly instruction on essential steps necessary to take an idea through to solution development. The capstone project will serve as the culmination of what the students have learned through the program and provide evidence of their competence to take the theories, concepts and applications into their daily practice.

5160. Common and Comorbid Health Problems in AGNP Acute Care Practice III

Three credits. Prerequisite: NURS 5400, 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: Concurrent with NURS 5160. Prerequisite within 6 months NURS 5400, 5409, and 5150.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5170. Complex and Comorbid Health Problems in AGNP Acute Care Practice IV

Three credits. Prerequisite: NURS 5160 and 5169 within 6 months. NURS 5179 is taken concurrently.

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 NURS 5169 within 6 months. Corequisite: NURS 5170.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5190. Fieldwork I in Life Story Practice and Research

Two credits. Prerequisite: NURS 5191, 5193, and 5194; open only to graduate students, instructor consent required.

Students are required to plan, conduct, and evaluate individual and/or group reminiscence or structured life review sessions as applicable to their population of interest. Weekly seminars will guide the student through the experience.

5191. Foundations of Life Story Practice and Research

Three credits. Prerequisite: Instructor consent; baccalaureate degree.

The course will provide the students with the historical and theoretical perspectives of life story methods. The published research of leading contributors in the field will be critiques. Students will compare and contrast different life story methods and theories.

5192. Fieldwork II in Life Story Practice and Research

Two credits. Prerequisite: NURS 5190, 5191, 5193, and 5194; open only to graduate students, instructor consent required.

Under the supervision of a mentor, students will have the opportunity to explore an individual's, a family's, or group's past by utilizing a method such as personal history, narrative, memoir writing, guided autobiography or digital storytelling. Students will work with an individual, family or group to create a unique presentation (i.e. video, puppetry, artwork, memory book) reflecting the life story.

5193. Life Story Methods

Three credits. Prerequisite: NURS 5191; baccalaureate degree and instructor consent required.

This is the second course in a five course sequence for the Certificate in Life Story Practice and Research. In this course students will acquire the knowledge, skills, and principles for conducting successful Life Story sessions. Interview techniques, strategies for conducting individual and group sessions, and cultural considerations will be examined. Students will apply concepts by conducting life story sessions with individuals, families, or groups by the end of the course.

5194. Seminar in Life Story Practice and Research

Two credits. Prerequisite: NURS 5191 and 5193; open only to graduate students, instructor consent required.

National and international faculty specializing in guided autobiography, personal history, memoir writing, and other life story methods will present their innovations, research, and practice experiences in an online seminar format. Emphasis will be placed on preparing students for their fieldwork experiences.

5230. Healthcare Finance for Nurse Leaders

Three credits. Prerequisite: Instructor consent; open to graduate nursing students.

Analysis of the financing of healthcare from the macro, meso and micro system perspective; a focus on governmental and private payers; an examination of systems, department and unit level budgets.

5235. Healthcare Quality Improvement, Outcomes Management, Assessment and Planning for the Nurse Leader

Three credits. Prerequisite: Instructor consent required; open to graduate nursing students.

An examination of unit and system based health care outcomes; their identification, measurement and purpose along with principles of quality improvement processes and assessment and planning principles and concepts.

5240. Nursing Leadership Foundations

Three credits. Prerequisite: Instructor consent; open to graduate nursing students. May be repeated for credit.

Introduction to the process of nursing leadership. Emphasis placed on theories of leadership, motivation, organization design and problem solving.

5245. Nursing Leadership Application

Three credits. Prerequisite: Open to nursing graduate students; instructor consent required. Prerequisite or Corequisite: NURS 5240.

Application of management theories to nursing leadership focusing on staff development, labor relations, staffing and scheduling, patient classification systems, healthcare innovation, quality improvement management, performance and program evaluation and human resources management.

5249. Masters of Science in Nursing Capstone Experience

Three credits. Prerequisite: Open to graduate nursing students, instructor consent required.

Integration of concepts, theories and principles pertinent to the student's specialty track, in an experiential learning setting, demonstrating integration of new knowledge and attainment of program outcomes.

5350. Advanced Embryology and Neonatal Physiology

Three credits. Prerequisite: Open only to students in graduate-level Neonatal Nursing programs.

This course examines fetal, transitional, and neonatal physiology. Embryology is also discussed, as the basis for neonatal development.

5362. Advanced Health Assessment for the Nurse Practitioner Role: Neonatal Population-focus

Three credits. Prerequisite: NURS 5350.

This course is designed to 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. Prerequisite: NURS 5350. Not open for credit to students who have passed NURS 5369.

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 5365; instructor consent required.

Focuses on the acquisition and application of in-depth physiological and psychosocial knowledge to the nursing care of neonates and their families. Emphasis is placed on the role of advanced practice in nursing management of high-risk neonatal populations. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5370. Advanced Principles of Pharmacology and Management: Neonatal Population-focus

Three credits. Prerequisite: NURS 5350.

Emphasis is placed on advanced principles of pharmacodynamics, pharmacotherapeutics, and pharmacologic management for the neonatal population as appropriate for the neonatal nurse practitioner role and scope of practice.

5375. Advanced Neonatal Nursing Theory II

Three credits. Prerequisite: NURS 5365 and 5369; instructor consent required.

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 5369; instructor consent required.

This course builds on the mastered components from prior clinical course work (NURS 5369). The focus of this practicum is on the acquisition and application of in-depth physiological and psychosocial knowledge in the management of the high-risk neonatal population and their families with a moderate level of independence and autonomy in the NNP role as appropriate for second semester students. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5385. Advanced Neonatal Nursing III

Three credits. Prerequisite: NURS 5375 and 5379; instructor consent required.

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; instructor consent required.

This course builds on the mastered components from prior clinical course work (NURS 5369 and NURS 5379). The focus of this practicum is on the acquisition and application of in-depth physiological and psychosocial knowledge in the management of the high-risk neonatal population and their families with an advanced level of independence and autonomy in the NNP role as appropriate for final semester students. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5400. EBP for Health Promotion, Prevention, and Common Health Problems I: Population Specific AGPCNP, FNP

Three credits. Prerequisite: NURS 5060; NURS 5062 within six months; NURS 5070 which may

be taken concurrently; open to students in nursing MS and BS-DNP programs; instructor consent required. Corequisite: NURS 5405 and 5409.

Grounded in theory and evidence, this initial didactic clinical course focuses on developing critical thinking skills and evidenced-based practice processes to achieve primary care nurse practitioner core competencies and domains and standards of clinical primary care. 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 primary care and family nurse practitioners.

5405. EBP for Common and Chronic Health Problems II: Population Specific AGPCNP and FNP

Three credits. Prerequisite: NURS 5060, 5062, and 5470; open to MS, BS-DNP, Post-MS Certificate students in the Adult Gerontology Primary Care Nurse Practitioner and Family Nurse Practitioner concentrations. Corequisite: NURS 5400 and 5409.

Grounded in theory and evidence, this didactic clinical course focuses on application of critical thinking skills necessary and evidence-based practice processes to achieve primary care nurse practitioner core competencies and domains and standards of clinical primary care. 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 primary care and family nurse practitioners.

5409. APN Clinical Practicum I

Three credits. Prerequisite: NURS 5062 within six months. Corequisite: NURS 5400. Not open for credit to students who have passed NURS 5430.

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 (240 hr/semester). Taken by all students in adult-gerontology acute care, adult-gerontology primary care, and family nurse practitioner tracks. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5410. Evidence-based Practice for Common and Comorbid Health Problems III Population Specific AGPCNP & FNP

Three credits. Prerequisite: NURS 5400, 5405, and 5409. Corequisite: NURS 5419 for Adult Gero Primary Care Nurse Practitioner students or NURS 5439 for Family Nurse Practitioner students.

Open only to MS, BS-DNP or Post MS certificate nursing students. Instructor consent required.

Grounded in theory and evidence, this didactic clinical course focuses on integration of critical thinking skills and evidenced-based practice processes necessary to achieve advanced practice nursing core competencies and domains and standards of clinical primary care. The emphasis is on health promotion and maintenance, and primary care assessment, diagnosis, and management of common and co-morbid health conditions among populations specific to adult-gerontology primary care and family nurse practitioners.

5419. Adult-Gerontology Primary Care NP Clinical Practicum II

Three credits. Prerequisite: NURS 5400, 5405, and 5409. Corequisite: NURS 5410. Open only to students matriculated as either post-MS certificate, MS or BS-DNP programs of study in Adult Gerontology Primary Care Nurse Practitioner concentration.

Clinical Practicum and seminar course that focuses on integrating 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 evidence-based health promotion and maintenance, and clinical assessment, diagnosis, and management of common and co-morbid health problems among populations, including individuals, families, and communities specific to adult-gerontology primary care or family nurse practitioners. Credits include online seminar and 240 hours of clinical per semester (~2 days per week for 14-week fall semester). Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5420. Evidence-based Practice for Complex and Comorbid Health Problems IV: Population Specific AGPCNP FNP

Three credits. Prerequisite: NURS 5410, NURS 5419 for students in the AGPCNP concentration or NURS 5439 for student in the FNP concentration. Corequisite: NURS 5429 for students in the AGPCNP or NURS 5449 for students in the FNP concentration. Instructor consent required.

Grounded in theory and evidence, this didactic clinical course focuses on synthesis of critical thinking skills and evidenced-based practice processes necessary to achieve advanced practice nursing core competencies and domains and standards of clinical primary care. 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.

5429. Adult-Gerontology Primary Care NP Clinical Practicum III

Three credits. Prerequisite: NURS 5410 and 5419. Corequisite: NURS 5420. Open only to students matriculated as either post-MS certificate, MS or BS-DNP programs of study as Adult Gerontology Primary Care Nurse Practitioner concentration.

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 evidence-based health promotion and maintenance, and clinical assessment, diagnosis, and management of more complex and co-morbid health problems among populations, including individuals, families, and communities, specific to adult-gerontology primary care nurse practitioners. Credits include online seminar and 240 hours of clinical per semester (~2 days per week for 14-week spring semester plus intensive). Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5430. Management of Childbearing Women and Children

Three credits. Prerequisite: NURS 5400 and 5409 within six months; NURS 5150, which may be taken concurrently. Not open for credit to students who have passed NURS 5439.

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. Family Primary Care NP Clinical Practicum II

Three credits. Prerequisite: NURS 5400, 5405, 5409, and 5430. Corequisite: NURS 5410. Open only to students matriculated as either post-MS certificate, MS, or BS-DNP programs of study as Family Nurse Practitioner student.

Clinical Practicum and seminar course that focuses on integrating 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 evidence-based health promotion and maintenance, and clinical assessment, diagnosis, and management of common and co-morbid health problems among populations, including individuals, families, and communities specific to family nurse practitioners. Credits include online seminar and 240 hours of clinical per semester (~2 days per week for 14-week fall semester). Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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. Family Primary Care NP Clinical Practicum III

Three credits. Prerequisite: NURS 5409 and 5439. Corequisite: NURS 5420. Open only to students matriculated as either post-MS certificate, MS or BS-DNP programs of study as Family Nurse Practitioner student.

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 evidence-based health promotion and maintenance, and clinical assessment, diagnosis, and management of more complex and co-morbid health problems among populations, including individuals, families, and communities, specific to family nurse practitioners. Credits include online seminar and 240 hours of clinical per semester (~2 days per week for 14-week spring semester plus intensive). Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5470. Advanced Pharmacology for Advanced Nursing Practice Primary Care Focus

Three credits. Prerequisite: NURS 5060; Instructor consent; Open only to Post-Graduate APRN Certificate, MS, and BS-DNP Family Nurse Practitioner and Adult Gerontology Primary Care Nurse Practitioner students.

This course emphasizes pharmacodynamics and pharmacokinetics required for appropriate evidence-based pharmacotherapeutic management in primary care.

5500. Advanced Diagnosis for APN Practice

Three credits. Prerequisite: NURS 5060, 5550, 5559, 5560, 5562, 5569; open only to graduate students in the Adult Gerontology Acute Care Nurse Practitioner concentration. Corequisite: NURS 5570.

Grounded in theory and evidence, this didactic course focuses on application of critical thinking skills necessary to achieve advanced practice nursing core competencies and domains. The emphasis is on developing differential diagnosis skills, assessment, and management of common and chronic health problems. Students will also be introduced to developing differential diagnosis utilizing imaging technologies and laboratory data, including but not limited to radiographs, CT imaging, laboratory values and other pertinent diagnostic testing.

5550. Common and Chronic Health Problems in AGNP Practice I: Population Specific AGACNP

Three credits. Prerequisite: NURS 5060 and 5562; open only to graduate students in the Adult Gerontology Acute Care Nurse Practitioner concentration. Corequisite: NURS 5559.

Grounded in theory and evidence based practice the first of three didactic adult gerontology acute care courses develops the students' clinical foundation of advanced practice nursing management of common and chronic health care problems common to adult and geriatric patients. This course builds upon the student's proficiency in comprehensive health evaluation within the context of acute care disease management of the adult and gerontology population. Emphasis is placed on the diagnosis and management of acute episodic and chronic conditions of adult and geriatric patients. Interdisciplinary collaboration among health care providers is promoted.

5559. AGNP Acute Care Clinical Practicum I

Three credits. Prerequisite: NURS 5060 and 5562; open only to graduate students in the Adult Gerontology Acute Care Nurse Practitioner concentration. Corequisite: NURS 5550.

The first of three clinical practicum courses in the adult gerontology acute care nurse practitioner curriculum. This course is designed to introduce the role of the adult gerontology acute care nurse practitioner. Using an evidence-based practice framework, the student will assess and manage acute and chronic illnesses in the clinical setting, including demonstration of knowledge of pathophysiology and pharmacologic interventions according to current standards of care for the adult and older adult population in acute care clinical settings.

5560. Complex and Comorbid Health Problems in AGNP Acute Care Practice II: Population Specific AGACNP

Three credits. Prerequisite: NURS 5060, 5550, 5559, 5562; open only to graduate students in the Adult Gerontology Acute Care Nurse Practitioner concentration. Corequisite: NURS 5569.

Grounded in theory and evidence based practice the second of three didactic adult gerontology acute care courses develops the students' clinical foundation of advanced practice nursing management of complex and comorbid health care problems common to adult and geriatric patients. This course builds upon the student's proficiency in comprehensive health evaluation within the context of acute care disease management of the adult and gerontology population. Emphasis is placed on the diagnosis and management of acute episodic and chronic conditions of adult and geriatric patients. Interdisciplinary collaboration among health care providers is promoted.

5562. Adv. Health Assessment and Diagnostic Reasoning Nurse Practitioner Role: AGACNP Population Focus

Three credits. Prerequisite: NURS 5060; open only to graduate students in the Adult Gerontology Acute Care Nurse Practitioner concentration.

Principles and techniques of advanced health assessment including formulation of a clinical diagnosis based upon the health assessment findings of the adult gerontology acute care patient from adolescence to elder are examined and practiced.

5569. AGNP Acute Care Clinical Practicum II

Three credits. Prerequisite: NURS 5060, 5550, 5559, 5562; open only to graduate students in the Adult Gerontology Acute Care Nurse Practitioner concentration. Corequisite NURS 5560.

The second of three clinical practicum courses builds upon the student's proficiency in comprehensive health evaluation within the context of acute care disease management of the adult and older adult population. Using an evidence-based practice framework, the student will assess and manage acute and chronic illnesses, including demonstration of knowledge of pathophysiology and pharmacologic interventions according to current standards of care for the adult and older adult population in acute care clinical settings. This clinical practicum course 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.

5570. Complex and Comorbid Health Problems in AGNP Acute Care Practice III: Population Specific AGACNP

Three credits. Prerequisite: NURS 5060, 5550, 5559, 5560, 5562, and 5569; open only to graduate students in the Adult Gerontology Acute Care Nurse Practitioner concentration. Corequisite NURS 5579.

Grounded in theory and evidence based practice the third of three didactic adult gerontology acute care courses develops the students' clinical foundation of advanced practice nursing management of complex and comorbid health care problems common to adult and geriatric acute care patients. This course builds upon the student's proficiency in comprehensive health evaluation within the context of acute care disease management of the adult and gerontology population. Emphasis is placed on the diagnosis and management of acute episodic and chronic conditions of adult and geriatric patients. Interdisciplinary collaboration among health care providers is promoted.

5579. AGNP Acute Care Clinical Practicum III

Three credits. Prerequisite: NURS 5060, 5550, 5559, 5560, 5562, 5569; open only to graduate students in the Adult Gerontology Acute Care Nurse Practitioner concentration. Corequisite NURS 5570.

The third of three clinical practicum courses builds upon the student's proficiency in comprehensive health evaluation within the context of acute care disease management of the adult and older adult population. 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 comorbid health problems among populations, including individuals, families, and communities, specific to the adult-gerontology acute care nurse practitioner. This clinical practicum course 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.

5590. Adv. Pharmacodynamics and Implications for Nursing Actions Adult Gerontology Acute Care Population

Three credits. Prerequisite: NURS 5060; Instructor consent; Open only to Post-Graduate APRN Certificate, MS, and BS-DNP students in the Adult Gerontology Acute Care program.

Emphasis is placed on advanced principles of pharmacodynamics, pharmacotherapeutics, and pharmacologic management for the adult gerontology acute care population as appropriate for the acute care provider role and scope of practice.

5700. Health Professions Education: Evaluation

Three credits. Prerequisite: Master's or doctoral degree.

This course will introduce students to important principles of evaluation science, with a particular emphasis on formative and summative evaluations. The course 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.

This course will introduce students 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.

This course will introduce students 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 to Nursing graduate students, others with consent.

This course is required of all graduate students in the Advanced Practice programs (APRN). The purpose of the master's program is to prepare advanced practice nurses with specialized knowledge, skills and values. Graduates assume leadership roles in the health care system and advance practice and the discipline of nursing by applying existing nursing knowledge and using a spirit of inquiry to examine and test nursing knowledge. Exploration of the application of genetics and genomics to the delivery of precision healthcare.

5845. Health Services Statistics & Research Methods for the Scholarship of Application

Three credits. May be repeated for a total of 6 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 theories applicable to the healthcare delivery system. Emphasis is on an in-depth examination of concepts and theories appropriate for practice change projects.

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 to Nursing graduate students, others with consent.

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. May be repeated for a total of 6 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5870. Health Policy and Populations-based Advocacy for the Scholarship of Application

Three credits. Prerequisite: NURS Grad Majors; open to graduate students in other disciplines with instructor 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. May be repeated for a total of 6 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5885. Leadership and Management for the Scholarship of Application

Three credits.

This course will encompass 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. May be repeated for a total of 6 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5895. Doctor of Nursing Practice Seminar Series for the DNP Project

Variable (1-9) credits. May be repeated for credit.

Designed to assist students with the DNP Project. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6100. Philosophy of Science in Nursing

Three credits. Prerequisite: Open to nursing Ph.D. students; others with instructor consent.

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, methodology, and innovation will be analyzed and compared. Examples drawn from nursing epistemology as well as that of other disciplines will be utilized to depict the prepositions of modern science.

6101. Grantsmanship: The Pursuit of Scholarly Support

Three credits. Prerequisite: NURS 6122 and 6130; instructor consent required.

A pragmatic exploration of the societal and professional realities of grantsmanship. Experiences are practical so as to enhance the development of knowledge, skills, and attitudes needed to secure funding for scholarly innovative research endeavors. Team science and grant writing are integral components of this course.

6122. Quantitative Methods for Design and Analysis in Nursing Research I

Three credits. Prerequisite: Masters level course in applied statistics equivalent to NURS 5020; course open to students not in the Nursing PhD Program with instructor consent.

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 to students not in the Nursing PhD Program with instructor 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 to students not in the Nursing PhD program with instructor 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. Prerequisite: Open to students in the Nursing Ph.D. program, others with instructor consent.

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 and instructor consent required for non nursing doctoral students.

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.

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 6125 and NURS 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; instructor consent required.

The course is a critical application of nursing knowledge and teaching and learning science 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.

Nutritional Sciences (NUSC)

5000. Nutritional Biochemistry

Three credits. Prerequisite: Open only to NUSC students. Not open to students who have passed NUSC 4236.

Biochemical processes for the metabolism and functions of carbohydrates, proteins, lipids, and vitamins.

5100. Concepts of Nutrition

Two credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5200. Macronutrient Metabolism

Three credits. Prerequisite: MCB 2000 or equivalent; open only to Nutrition Sciences students, instructor consent required.

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.

5280. U.S. Nutrition and Food Regulations

Three credits. Prerequisite: NUSC 5200.

Development of new nutrition products; regulations applicable to foods, medical foods, dietary supplements and ingredients; accurate and appropriate representation of scientific evidence for substantiating label claims and advertisements.

5300. Vitamins and Minerals

Three credits. Prerequisite: MCB 2000 or equivalent; open only to Nutrition Sciences students, instructor consent required.

Comprehensive study of vitamins and macro-/trace minerals on the levels of biochemical and physiological functions, metabolic pathways, interactions, and deficiencies/toxicities.

5319. Nutrition Research Methods in Clinical and Population Studies

Three credits. Prerequisite: Instructor consent.

Basic concepts and methodologies of research in public health and observational and clinical nutritional sciences, research proposal writing and in-class presentation.

5325. Principles of Nutritional Assessment

Three credits. Prerequisite: NUSC 5200.

Nutritional assessment as a systematic process of obtaining and interpreting data to characterize nutritional status in association with health and nutrition-specific problems for individuals and selected populations. Interpretation of dietary, anthropometric, and laboratory data as applied to case studies.

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 total of 4 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.

Advanced study in a given area of nutritional science.

5399. Independent Study in Nutritional Science

Variable (1-6) credits. May be repeated for a total of 9 credits.

Research problems or critical review of literature in any area of nutrition.

5400. Molecular Techniques and Instrument Analysis in Nutrition

Two credits. Prerequisite: MCB 2000 or equivalent.

Provide hands-on experience performing basic molecular nutrition techniques and cover theoretical bases and application.

5410. Clinical Nutrition

Three credits. Prerequisite: NUSC 5200.

Application of principles of human nutrition, physiology, and biochemistry to progressive pathology of selected diseases and associated effects on nutritional status, nutritional needs, nutrient intake and utilization in the context of the nutrition care process.

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.

5510. Plant-based Diets and Nutrition

Three credits. Prerequisite: Instructor consent.

The nutritional and health aspects of various plant-based food groups with emphasis on the nutrient composition and their roles in health promotion and disease prevention. It also provides the principles of designing and implementing healthy plant-based diets and its implications.

5520. Plant-based Food Products

Three credits. Prerequisite: Instructor consent.

Healthy and sustainable plant-based food alternatives to animal food products, including alternatives of meat, fish, egg, milk and other dairy products. Current research and innovations in plant-based foods and their nutritional implications, socioeconomic and environmental impacts.

5600. Pathophysiology of Metabolic Diseases

Three credits. Prerequisite: NUSC 5200.

Biochemical, physiological and molecular aspects of energy metabolism and inflammatory pathways involved in pathogenesis of metabolic diseases; diet and dietary component contribution to pathogenesis.

5700. Precision Nutrition

Three credits. Prerequisite: NUSC 5200.

Studies the foundation of precision nutrition which encompasses research focusing on the interaction between nutrients and human/microbial genes and identifies genetic backgrounds contributing to individual differences in macro and micronutrient metabolism. Examines the effects of dysregulated nutrient-gene interactions in pathophysiological conditions.

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: NUSC 5200 and 5300.

Studies the regulations of eukaryotic gene expression by various macro-/micronutrients and their metabolites in the scope of epigenetic, transcriptional, post-transcriptional, translational, and post-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.

Principles and applications of nutritional epidemiology with emphasis on research design.

6410. Advanced Clinical Nutrition

Three credits. Prerequisite: NUSC 5410.

Interrelationships of physiology and biochemistry of disease and dietary intervention involving complex conditions, alternative approaches to therapeutic nutrition and extension to special populations. Clinical nutrition research in the context of therapeutic practice and case studies.

Operations and Information Management (OPIM)

5103. Managerial Statistics

Three credits. Prerequisite: Open to graduate business students only, others with consent. Not open to students who have passed or are currently enrolled in 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: Open to MBA and MSBAPM students, others with consent. Not open to students who have passed or are currently enrolled in 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.

5111. Supply Chain Analytics

Three credits. Prerequisite: Open only to MBA, MSBAPM, and Advanced Business Certificate in Supply Chain Analytics students, others with consent.

Managing supply chains is a complex and challenging task, given the current business trends of expanding product variety, globalization and digitalization of business, and ever changing customer expectations for fast and on-time delivery. To make right and timely decisions in the era of big data, an increasing number of companies have started to apply data analytics in supply chain management. A recent Accenture survey reveals that the use of data analytics has successfully helped companies improve customer service, reduce reaction time to supply chain issues, increase supply chain efficiency, and drive greater integration across the supply chain. This course will introduce the concepts and methods related to the design, planning, control, and coordination of supply chains with a focus on the applications of data analytics in supply chain management. The course consists of various components: lectures, case studies and a simulation game. In lectures, we introduce theoretical frameworks and useful analytical models. In case studies, we analyze supply chain issues under real-world business scenarios. In the simulation game, you will (virtually) manage a supply chain of fruit juice.

5112. Strategic Sourcing

Three credits. Prerequisite: Open only to MBA, MSBAPM, and Advanced Business Certificate in Business Analytics students, others with consent.

Sourcing (or purchasing) has evolved as a strategic function that affects firms' ability to meet customer needs and their competitive advantages in today's global business environment. It refers to the collaborative and structured process of acquiring goods and services from suppliers, along with the function of managing suppliers, to achieve desired supply chain performance. This course introduces the framework and fundamental concepts in sourcing, as well as the tools to effectively manage the strategic sourcing process.

5113. Distribution and Logistics

Three credits. Prerequisite: Open only to MBA, MSBAPM, and Advanced Business Certificate in Supply Chain Analytics students, others with consent.

Economic globalization has increased the criticality of distribution, transportation, and logistics operations for the global supply chain. A calamity in any part of a distribution system, including transportation of raw materials, warehousing, delivery of finished goods, etc., can lead to costly repercussions such as supply shortages, revenue losses and customer

dissatisfaction. An efficient and effective distribution and logistics system is vital to the success of businesses as it bridges temporal and geographical gaps between production and consumption. The recent development of e-commerce and customers' increased awareness of sustainability have posed new challenges in distribution and logistics strategies. Introduces concepts related to the global supply chain and distribution strategies, transportation and logistics planning, and warehouse operations. Emphasis on quantitative methods and analytics tools for the design of distribution network, transportation planning, and logistics operations.

5165. Management Information Systems

Three credits. Prerequisite: Open to MBA and MSBAPM students, others with consent. Not open to students who have passed or are currently enrolled in 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: BADM 5180, which may be taken concurrently.

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. Prerequisite: Corequisite: BADM 5181; open to students in the Full Time MBA Program, others with consent.

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, this course 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 or 5603. 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. Data Management and Business Process Modeling

Three credits. Prerequisite: Open only to MBA, MSBAPM, and MS FinTech students, others with consent.

Introduces common techniques for relational data management, including conceptual modeling, table design and Structured Query Language (SQL). Additionally covers topics from business process re-engineering, with a focus on process modeling and how process improvement influences favorable database design.

5500. Field Study Internship

Three credits. Prerequisite: Open to all MSBAPM and MS FinTech students. International students must have completed both a spring term and a fall term prior to taking this course. Departmental consent required. May be repeated for a total of 6 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5501. Visual Analytics

Three credits.

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 Cloud Computing

Three credits. Prerequisite: OPIM 5604 or BADM 5604; and OPIM 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 such as 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 data programming concepts. Students may be required to install some software on their computers on their 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 5603; open only to MBA and MSBAPM students, others with consent.

The use of techniques from statistics and optimization to implement adaptive business

intelligence (ABI) decision support systems. The course will introduce students to the different components of ABI systems as well as to the fundamentals of adaptive statistical methods, simulation adaptive methods, and evolutionary algorithms. Applications to diverse management contexts evolving in time will also be discussed.

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. Agile Project Management

Three credits. Prerequisite: Open only to MBA and MSBAPM students, others with consent. Corequisite: OPIM 5270.

Foundations of the agile revolution as Lean Six Sigma theories cross over from manufacturing to software, product design, startups, and innovation. Dissects the types of organizations where Agile will work, and where it won't. Recognition of Personas, and their impact on development and product design. Leadership components required at the transformation level, product owner level, scrum master level, and sprint team level. Test Driven Design and Extreme programming theories underscore the new attributes away from traditional project management. Introduction of agile metrics and the management decisions required when risk or conflict begin to derail an Agile effort. Leverages Trello or Jira, two of the most popular Agile Project Management software packages used in companies today.

5508. Healthcare Analytics and Research Methods

Three credits. Prerequisite: BADM 5103 or BADM 5180 or OPIM 5103 or OPIM 5603; open only to MBA and MSBAPM students, others with consent. Not open for credit to students who have passed OPIM 5894 when offered as Healthcare Analytics.

Evidence-based practice, research techniques, health data collection devices, legislation and

regulation of health data, ethical use of health data, and reporting tools. Prepares students for employment opportunities within a clinical or medical research environment.

5509. Introduction to Deep Learning

Three credits. Prerequisite: OPIM 5512 and 5604; open only to MBA, MSBAPM, and MS FinTech students, others with consent. Not open to students who have passed OPIM 5894 when offered as Introduction to Deep Learning.

Introduction to topics related to deep learning and will build on your previous experience in predictive analytics. Use of neural networks for a host of data and applications - including time series data, text data, geospatial data, and image data.

5510. Web Analytics

Three credits. Prerequisite: OPIM 5604; open only to MBA and MSBAPM students, others with consent. Not open for credits who have passed OPIM 5894 when offered as Web Analytics.

Introduction to key concepts, techniques, and tools for analyzing web data to derive actionable customer intelligence, develop digital marketing strategies and evaluate their impacts. Clickstream tracking, search engine analytics, digital experiments, and social analytics.

5511. Survival Analysis with SAS

Three credits. Prerequisite: OPIM 5604; open only to MBA and MSBAPM students, others with consent. Not open for credits who have passed OPIM 5894 when offered as Survival Analysis using SAS.

Describes the various methods used for modeling and evaluating survival data, also called time-to-event data. General statistical concepts and techniques, including survival and hazard functions, Kaplan-Meier graphs, log-rank, and related tests, Cox proportional hazards model, and the extended Cox model for time-varying covariates and non-proportional hazards.

5512. Data Science using Python

Three credits. Prerequisite: OPIM 5604; MBA, MSBAPM, and MS FinTech students, others with consent. Recommended preparation: Students are expected to know the fundamentals of Python programming language (or another language) through self-study, previous coursework or previous work experience, including topics such as loops, functions, and data structures. Not open to students who have passed OPIM 5894 when offered as Data Science with Python.

Data science concepts using the Python programming language. Data wrangling and management using Pandas; visualization using Matplotlib; fundamentals of matrix algebra and regression, with illustrations using Numpy; machine learning, focusing on fundamental concepts, classification, and information extraction.

5513. Blockchain

1.5 credits.

This course examines the foundations of blockchain technology from multiple perspectives, including engineering, law, and economics. The course will cover blockchain technologies, distributed ledger technology, cryptocurrencies (e.g., Bitcoin), and their applications, implementation, and security concerns. Students will learn how these systems work; analyze the security and regulation issues relating to

blockchain technologies, and understand the impact of blockchain technologies on financial services and other industries. The student will get a detailed picture of blockchain business networks' components and structures, such as ledgers, smart contracts, consensus, certificate authorities, security, roles, transaction processes, participants, and fabrics.

5514. Mobile Application Development

Three credits. Prerequisite: Open only to MS FinTech students, and others with consent.

The focus of this course is to use cross-platform mobile application development technologies to develop mobile apps for both iOS and Android systems. Students will learn how to plan and create their own mobile apps. Graphical User Interface (GUI) design skills as well as programming logics will be taught and emphasized throughout the course. Upon completion of this course, students should be able to use the programming skills they learn to develop useful and user-friendly mobile apps for both iOS and Android devices.

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 MBA, MSBAPM, and MS FinTech students, others with consent.

Advanced level exploration of statistical techniques for data analysis. Students study basic concepts in descriptive and inferential statistics, data organization and visualization, sampling, probability, random variables, sampling distributions, hypothesis testing, linear regression, and logistic regression. 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, MSBAPM, and MS FinTech 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.

5605. Data Visualization and Communication

Two credits. Prerequisite: Open only to M.S. Data Science students; others with consent.

Data visualization is a form of storytelling that provides an effective way to draw conclusions and share insights, allowing people to express big, complex ideas in simple ways. Utilizing state of the art software, the use of parameters, filters, calculated variables, color, space and motion to visually articulate the data are surveyed. Common pitfalls and ethics issues in visualization design are also considered. This interactive course is designed to help students learn the methods, tools, and techniques to best understand and present complex data so that they can persuasively share results and influence decisions.

5620. Managing and Controlling Information Systems

Three credits. Prerequisite: Open to MBA and MSBAPM students, others with permission. MBA prerequisite: OPIM 5165 or OPIM 5182.

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. The course will emphasize the representation of business decision problems as optimization problems and the use of specialized software to solve and analyze problems, as well as input data, and retrieve results.

5668. Project Risk Management and Agile Methodologies

Three credits. Prerequisite: OPIM 5270; open to MBA and BAPM students, others with consent.

Introduces the art and science of risk management, as well as continuity and cost management, to projects. Risk management encompasses many methodologies, all of which ensure a project is completed through general and severe business disruptions. Identifying, analyzing, and responding to project risks are all examined through actual case studies utilizing various risk management techniques spanning concepts such as cost estimation, cost control, procurement, contracts, project selection, and project quality. This course also features an introduction to Agile project management, covering several topics such as Agile values and principles, Agile planning, Scrum, user stories, Kanban, and product backlogs.

5671. Data Mining and Business Intelligence

Three credits. Prerequisite: OPIM 5604 or BADM 5604; open only to MBA, MSBAPM, and MS FinTech 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, 5272, 5668, and 5671. Open to MSBAPM and MBA students only.

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 to MSBAPM and MBA students, others with permission.

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. Special Topics

Variable (1-6) credits. May be repeated for a total of 18 credits.

Introduces many of the most exciting and timely topics and advanced tools emerging in the field of data analytics and project management as announced in advance for each semester. With a change in content, may be repeated for a total of 18 credits.

5895. Special Topics in Information Management

Variable (1-3) credits. 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. May be repeated for a total of 9 credits.

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. The course will also acquaint students with the variety of research tools used in the field, enable 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.

6204. Seminar in Operations Research and Optimization

Three credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Introduces classical and state-of-the-art optimization methods, modeling techniques, exact algorithms and heuristics, emphasizing deterministic operations research and computational complexity theory.

Pathobiology (PATH)

5094. Pathobiology Seminar

One credit. May be repeated for a total of 10 credits. Formerly offered as PVS 5094.

5099. Research and Independent Study in Animal Diseases

Variable (1-6) credits. May be repeated for a total of 24 credits. Formerly offered as PVS 5099.

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. Formerly offered as PVS 5201.

5202. Viral Pathogenesis

Three credits. Prerequisite: A course in virology or microbiology and one in biochemistry, with consent of the instructor. 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. Formerly offered as PVS 5202.

5203. Principles of Antibacterial Development

Three credits. Prerequisite: A course in general microbiology or bacteriology with consent of the instructor.

Important concepts and pioneering strategies currently being used to develop novel antibacterials. Formerly offered as PVS 5203.

5230. Vaccines and Immunotherapeutics

Three credits. Prerequisite: PATH 3401 or an equivalent course in immunology.

Students develop an understanding of approaches for scientists and engineers to use the immune system to combat infectious and chronic diseases. Both traditional and modern molecular approaches to vaccine and immunotherapy design will be discussed. Students will gain an appreciation for the transition from basic research to practical applications.

5300. Disc of Pathobiology and Veterinary Science Literature

One credit. May be repeated for a total of 3 credits.

Weekly discussion of current peer-reviewed literature related to pathobiological basis of disease. Formerly offered as PVS 5300. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5303. Veterinary Pathology Lecture Series

Variable (1-3) credits. May be repeated for a total of 9 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. Formerly offered as PVS 5303.

5392. Practicum in Veterinary Anatomic Pathology

Three credits. Prerequisite: Open only to veterinarians accepted into the residency program in veterinary pathology. May be repeated for a total of 18 credits.

Service-based learning of veterinary anatomic pathology through gross and histologic evaluation of necropsy and biopsy case material by direct review with faculty pathologists. Formerly offered as PVS 5392. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5394. Veterinary Pathology Seminar

Two credits. 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. Formerly offered as PVS 5394.

5401. Immunobiology

Four credits. Prerequisite: Open with consent of instructor to graduate students, upper-level Honors students, and senior undergrad 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. Formerly offered as PVS 5401.

5431. Avian Pathology

Two credits.

A comprehensive study of systemic avian pathology, stressing the correlation of pathological changes with clinical and microbiological findings. Formerly offered as PVS 5431.

5503. Molecular Approaches to Disease Diagnosis and Prevention

Two credits.

Molecular aspects of disease, with emphasis on methodologies and strategies for diagnosis, analysis and prophylaxis. Formerly offered as PVS 5503.

5594. Current Veterinary Pathology Literature

One credit. May be repeated for a total of 6 credits.

Detailed study of current veterinary pathology literature, with particular emphasis on lesions and mechanisms of disease. Formerly offered as PVS 5594.

5632. Vaccines: Mechanisms of Immune Protection

(Also offered as AH 5632.) Three credits.

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. Formerly offered as PVS 5632.

Pharmacy - PHAR (PHAR)

5215. Pharmaceutical Biotechnology

Three credits.

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 3 credits.

Designed to familiarize students with current pharmaceutics literature and to educate students in critical peer review in the pharmaceutics literature. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5240. Drug Discovery and Development

Two credits.

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.

5250. Pharmacogenomics and Personalized Medicine

Two credits. Prerequisite: Open to graduate students or by instructor consent for prepared upper-level undergraduates. Recommended preparation: A basic understanding of genetics is recommended.

The allied fields of pharmacogenomics and personalized medicine have become areas of intense interest. Each patient responds to drugs and medical treatments in an individualized way, often having to do with underlying genetics. Individual genetic variance often impacts treatment efficacy, pharmaceutical responses, and toxicological adverse events. This course will consider these knowledge areas, which are at the cutting edge of medical advance. Aspects of personalized medicine that go beyond genetics, including the use of patient-matched stem cells will also be discussed.

5293. Seminar in Pharmaceutics

One credit. May be repeated for a total of 2 credits.

Reports and discussions. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5295. Special Problems in Pharmaceutics

Variable (1-4) credits.

Individualized course 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. May be repeated for a total of 24 credits.

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.

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.

Reports and discussions. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5395. Special Problems in Medicinal Chemistry

Variable (1-4) credits. 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. May be repeated for a total of 12 credits.

Current developments in Medicinal Chemistry. A course for students needing exposure to topics not covered in other department offerings.

5403. Current Literature in Pharmaceutical Sciences

One credit. May be repeated for a total of 2 credits.

Designed to familiarize students with current pharmaceutical sciences literature and to educate students in critical peer review of this literature. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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.

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 5 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 2 credits.

Reports and discussions on journal and review articles and presentation of personal research results. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5494. Seminar in Immunology

One credit. May be repeated for a total of 2 credits.

Reports and discussions. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5495. Special Problems in Pharmacology I

Variable (1-4) credits. May be repeated for a total of 6 credits.

Individualized for students desiring research experience in any of the areas of pharmacology.

5496. Special Problems in Toxicology

Variable (1-4) credits. May be repeated for a total of 6 credits.

Individualized course for students desiring research experience in any of the areas of toxicology.

5497. Special Topics in Pharmacology

Variable (1-6) credits. May be repeated for a total of 24 credits.

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. May be repeated for a total of 24 credits.

Basic principles of toxicology as emphasized by recent developments in the biochemical toxicology literature.

5746. Introduction to Managed Care Pharmacy

Three credits.

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.

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

Variable (1-6) credits.

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.

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.

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.

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.

A study of the kinetics and mechanisms of drug degradation in the solid and liquid states and drug stabilization.

6289. Pharmacokinetics

Three credits.

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.

Interfacial phenomena, colloid chemistry.

6452. Toxicology of the Respiratory System

Two credits. Prerequisite: PHAR 6455.

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.

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.

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.

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.

Philosophy (PHIL)

5300. Independent Study for Graduate Students

Variable (1-6) credits. Prerequisite: Open to graduate students in Philosophy, others with consent. May be repeated for credit.

5301. Seminar in Contemporary Philosophy

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent.

An introduction to contemporary philosophers such as Russell, Carnap, Ayer, Quine, Putnam, and Kripke.

5302. Introduction to Moral Philosophy

Three credits. Prerequisite: Open to Philosophy Graduate students only, others with permission of instructor.

Introduction to ethical theory. Readings in historical and contemporary moral philosophy.

5305. Seminar in Aesthetics

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent.

A consideration of some of the basic problems in aesthetics.

5307. Logic

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent. May be repeated for a total of 9 credits.

5312. Seminar in the Philosophy of Science

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent. May be repeated for a total of 6 credits.

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 to graduate students in Philosophy, others with consent.

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 to graduate students in Philosophy, others with consent. May be repeated for a total of 6 credits.

A discussion and analysis of significant problems in ethical theory.

5316. Seminar in the Philosophy of Social Science

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent.

5320. Seminar in the History of Philosophy

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent. May be repeated for a total of 9 credits.

5325. Topics in Africana Philosophy

Three credits. Prerequisite: Open to graduate students in Philosophy and to others with permission. May be repeated for a total of 9 credits.

Philosophical problems from across African American philosophy, Afro-Caribbean philosophy, and African philosophy, examined using approaches from Africana analytical, dialectical, existential, feminist, phenomenological, and pragmatist thought. May include a historical focus on ideas from ancient African philosophy. May be repeated for up to nine credits with change in content.

5327. Seminar on Kant

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent.

5330. Seminar on Theory of Knowledge

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent. May be repeated for a total 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 to graduate students in Philosophy, others with consent. May be repeated for a total of 6 credits.

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 to graduate students in Philosophy, others with consent. May be repeated for a total of 9 credits.

5342. Seminar in Philosophy of Language

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent. May be repeated for a total of 6 credits.

5344. Seminar in Philosophical Logic

Three credits. Prerequisite: Open to Philosophy Graduate students only, others with permission of instructor. May be repeated for a total of 6 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 to graduate students in Philosophy, others with consent. May be repeated for a total of 6 credits.

5360. Seminar in Recent Continental Analytic Philosophy

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent.

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.

5380. Philosophical Issues of Race

Three credits.

An examination of philosophical problems, including those in metaphysics and epistemology to those in value theory ranging from aesthetics to ethics and political philosophy in the study of race. Topics include questions of how race is studied in philosophical anthropology, philosophy of freedom, and metacritical questions of the impact of race in how knowledge is produced or understood (such as epistemology).

5397. Seminar

Three credits. Prerequisite: Open to graduate students in Philosophy, others with consent. May be repeated for a total of 18 credits.

5484. Proposal, Prospectus, and Dissertation Writing Seminar

Variable (2-3) credits. Prerequisite: Open to graduate students in Philosophy; others by instructor consent. May be repeated for a total of 12 credits.

Philosophy students will write and circulate drafts and get feedback on their proposal, prospectus, or dissertation, and practice the presentation of their work. Students working on

philosophical theory outside the department are also welcome.

5800. Race in the Formation of the Human Sciences

(Also offered as ANTH 5800, LLAS 5800, and POLS 5800.) Three credits. Prerequisite: Not open for credit to students who have passed PHIL 5380.

Exploration of how race and the human sciences emerged out of the theological, epistemological, and political upheavals that resulted in the Euromodern world.

Physical Therapy (PT)

5410. Human Anatomy Trunk and Upper Extremity

Four credits.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Through comprehensive problem solving, students will learn to manage adult patients with neuromuscular dysfunction. Students will develop neurophysiologically sound examination and inter-vention 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.

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.

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.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5463. Integrated Clinical Experience, Musculoskeletal

Two credits. Prerequisite: Open to students in good standing enrolled in the Doctor of Physical Therapy program; all previous D.P.T program courses must have been passed.

Clinical experience that provides students the opportunity to integrate interventions learned in PT 5453 and 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.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5465. Public Engagement in Prevention, Health Promotion, Fitness and Wellness

One credit.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5466. Integrated Clinical Experience, Neuromuscular

Two credits.

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.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5469. Integrated Clinical Experience, Acute Care

One credit. Prerequisite: Students must be in good academic standing and be granted department consent.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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.

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.

5473. Geriatric Physical Therapy

Three credits. Prerequisite: Open only to students in the Physical Therapy Program.

An elective course for Doctorate of Physical Therapy students that covers the specialized practice of geriatric physical therapy. Provides in depth information about geriatric conditions for which physical therapy services are typically provided. Examines normal and pathological aging, and analyzes the evidence behind specialized geriatric assessments and interventions. Clinical opportunities will be included to integrate and apply the academic information.

5474. Leadership and Action for Health Professionals

Three credits.

The development of leadership skills through foundational readings, self-reflection, collaboration with peers and faculty, and project development with external entities to promote the health of society. Explores opportunities for professional engagement in advocacy efforts at the local, state and national level.

5480. Interaction for Health Care and Society

Three credits. Prerequisite: Open to students enrolled in the D.P.T. program and others with departmental 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 PT 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. May be repeated for a total of 10 credits.

A special reading course. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5020. Research in Physics

Variable (1-6) credits. May be repeated for a total of 18 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. May be repeated for a total of 2 credits.

The treatment of special topics, primarily by individual readings and reports. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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 or instructor consent.

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 or instructor consent.

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 or instructor consent.

Maxwell's equations with time dependent sources; radiation from relativistic charged particles; dynamical laws for charged particles; diffraction of electromagnetic waves.

5350. Introduction to Computational Physics

Three credits. Recommended preparation: Python, C, C++, Unix.

Introduction to computational physics, including programming in C, C++, and Python. Topics include numerical integration of ordinary

differential equations, finite differences and stability analysis, numerical solution of partial differential equations (e.g., the Schroedinger and diffusion equations) in more than one dimension, Krylov space methods (e.g., eigensystem solvers and matrix inversion), and Monte Carlo integration. Introductory machine learning and high-performance computing methods may be covered. Writing code to solve current problems from selected areas of physics and astrophysics.

5401. Quantum Mechanics I

Three credits. Prerequisite: PHYS 5101 and 5201 or instructor consent.

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 or instructor consent.

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 or instructor consent.

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 or instructor consent.

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.

5698. Advanced Topics in Physics I

Variable (1-6) credits. May be repeated for a total of 24 credits.

Selected topics in theoretical and experimental physics.

5798. Advanced Topics in Physics II

Variable (1-3) credits. Prerequisite: PHYS 5698; instructor consent required. May be repeated for a total 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 wavefunctions; 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.

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.

6710. Stars and Compact Objects

Three credits. Prerequisite: Not open for credit to students who have passed PHYS 4710.

The structure and evolution of stars. Gravitational collapse, hydrostatic equilibrium, novae and shocks, and compact objects with degenerate matter.

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.

6730. General Relativity and Cosmology

Three credits. Prerequisite: Not open for credit to students who have passed PHYS 4730.

Gravity and the problem of motion from the ancient Greeks to Newton to Einstein. Special relativity. General relativity. Curvature. Classic tests of general relativity. Gravitational waves. Black holes. Newtonian cosmology. Big Bang theory. Inflation. Dark matter. Dark energy. Accelerating universe.

6740. Advanced Methods in Astrophysics

Three credits. Prerequisite: Open to Physics graduate students; others by permission. Not open for credit to students who have passed PHYS 4740.

Basic principles and techniques of observational and computational astrophysics. Statistical techniques for data analysis and interpretation of astronomical data. Data mining, visualization, and numerical techniques in simulations of astrophysical systems. Includes short research projects using data from observations and/or simulations.

Physiology and Neurobiology (PNB)

5001. Principles of Physiology and Neurobiology

Three credits.

Molecular foundations of physiology and neurobiology. Discussion of classic and emerging literature, experimental design, and research technologies. Topics may include genetics, protein biology, cell structure and function, and neurophysiology.

5002. Principles of Physiology and Neurobiology II

Three credits.

Foundations of physiology and neurobiology. Discussion of classic and emerging literature, experimental design, and research technologies. Emphasis on systems physiology.

5101. Anatomy and Physiology for Intraoperative Neuromonitoring

Four credits. Recommended preparation: course background in biology.

Anatomy and physiology of the nervous and musculoskeletal systems.

5102. Fundamentals of Intraoperative Neuromonitoring

Three credits.

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.

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 classes, 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. May be repeated for a total of 4 credits.

Presentations of clinical and nonclinical topics affecting the daily job of an intraoperative neuromonitoring clinician. Topics may 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.

Comprehensive didactic and laboratory training on advanced neuromonitoring modalities (tests)

such as Phase Reversal, Motor Mapping, D-Wave, Nerve Action Potential and H-Reflex.

5107. Clinical Research Methods in Intraoperative Neuromonitoring

Three credits. Prerequisite: PNB 5101, 5102 and 5103. Recommended preparation: PNB 5104 and 5105.

Research methods and experimental design in a clinical setting. Common and advanced neurodiagnostic modalities, effects of anesthesia on neurophysiological data, and evaluation of multimodality monitoring. Discussion and critique of published literature, and development of a student generated research proposal.

5270. Molecular Endocrinology

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.

Lectures and laboratory exercises on the principles and practice of biological electron microscopy. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5350. 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.

5351. Projects in Electron Microscopy

Variable (1-3) credits. May be repeated for a total of 12 credits.

Electron microscopy as a research method in biological sciences.

5395. Investigation of Special Topics in Physiology and Neurobiology

Variable (1-3) credits. May be repeated for a total of 24 credits.

Advanced study within Physiology and Neurobiology.

5396. Research in Physiology and Neurobiology

Variable (1-6) credits. May be repeated for credit.

Research in Physiology and Neurobiology in pursuit of a graduate degree.

5399. Independent Study

One credit. May be repeated for a total of 12 credits.

Independent investigation of topics in 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.

An in-depth study of selected topics in the molecular, cellular, and central aspects of neurobiology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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.

Provides the opportunity for graduate students to present journal articles and their laboratory research in physiology and neurobiology to the department.

6415. Ion Channels and Physiology

Three credits. Prerequisite: PNB 5001 and 5002.

Exploration of major classes of ion channels, including ligand-gated, voltage-gated, mechanosensitive, thermosensitive and light-sensitive channels and their roles in physiology. Discussions of research approaches and emerging technologies in ion channel physiology.

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 to PNB grad students or seniors who have passed PNB 3251, PNB 3275, and one of MCB 2000, 2210, or MCB 3010. Consent of instructor required for non-PNB graduate students.

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 in nerve cells including synaptic transmission. Molecular and cellular biology of selected neurological disorders.

Plant Science (PLSC)

5150. Design and Analysis of Agricultural Experiments

Four credits. 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: Not open to students who have passed SPSS 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.

5245. Plant Breeding and Biotechnology

Three credits. Prerequisite: One of BIOL 1102, 1108, 1110; MCB 2410; SPSS 3210, 3230, 4210, or instructor consent. Not open for credit to students who have passed SPSS 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.

5255. Modern and Traditional Plant Breeding Techniques

Three credits. Prerequisite: PLSC 5245. Not open for credit 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-mediate mutagenesis.

5260. Transdisciplinary Research and Participatory Design in Landscape Architecture

Three credits.

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.

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. Prerequisite: Not open for credit 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. Recommended preparation: environmental design coursework and familiarity with digital design programs. Consent of instructor required. Field trips required.

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. Recommended preparation: Environmental design coursework and familiarity with digital design programs. Field trips required.

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.

5820. Ecology and Control of Weeds

Three credits. Prerequisite: Not open to students who have passed SPSS 3820.

Weed identification. Weed origin and classification. Losses caused by weeds. Weed competition. Weed seed production, dormancy, and germination. Weed growth and development. Weed biology and life cycles. Cultural, mechanical, and biological weed control methods based on ecological principles. Overview of chemical weed control practices and associated environmental and ecological risks.

5897. Seminar

One credit. May be repeated for a total of 2 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. May be repeated for a total of 24 credits.

Topics and credits to be published prior to the registration period preceding the semester offerings.

5899. Independent Study

Variable (1-6) credits. May be repeated for a total of 24 credits.

Policy Practice (Social Work) (POPR)

5300. Advanced Macro Practice

Three credits. Prerequisite: Corequisite: FED 5352 or Student Group Social Work Advanced Standing.

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: Prerequisite or corequisite: POPR 5300.

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: POPR 5353. Corequisite: POPR 5354.

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

(Also offered as CORG 5310.) Three credits. Prerequisite: Corequisite: FED 5310.

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

(Also offered as CORG 5312.) Three credits. Prerequisite: FED 5310. Corequisite: FED 5311.

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. Prerequisite: Corequisite: BASC 5301.

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. Corequisite: FED 5310 and POPR 5310.

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required course for students in the Policy Practice concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5354. Field Education in Policy Practice IV

Four credits.

Focuses primarily on the student's major method, emphasizing preparation for competent, advanced specialized practice. Required course for students in the Policy Practice concentration. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5355. Block Placement in Policy Practice

Eight credits. Prerequisite: FED 5352 and FED 5302; open to MSW students in the Policy Practice concentration; instructor consent required. Corequisite: POPR 5310 and FED 5350.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Political Science (POLS)

5000. Independent Study in Political Science

Variable (1-6) credits. 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.

5117. Settler Colonialism/American Indigenous Thought and Practice

Three credits. Recommended preparation: POLS 5100.

Exploration of work in political theory engaging settler colonialism and historic and contemporary American indigenous thought and practice.

5119. Historical Women Political Thinkers

(Also offered as WGSS 5119.) Three credits. Recommended preparation: POLS 5100. Not open to students who have passed POLS/WGSS 3027/W.

Critical study of the writings of several historical women political thinkers.

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 a total of 24 credits.

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.

5390. Economic Rights

(Also offered as ECON 5128 and HRTS 5390.) Three credits.

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).

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

(Also offered as WGSS 5410.) 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.

5615. Seminar in Qualitative Methods of Political Science

Three credits. Prerequisite: POLS 5600 and 5605.

A survey of qualitative research methods. Training in use of case studies, comparative historical approach, interviewing and focus groups, ethnography and interpretive methods.

5620. Research Design and Development

Three credits.

Introduction to research methods and designs in political science. Students will develop and conduct original research projects. Intended for master's students in their first semester.

5621. Research Design and Development II

Three credits. Prerequisite: POLS 5620.

Advanced research methods and designs in political science. Students will develop and conduct original research projects. Intended for master's students in their second semester.

5625. Political Science Professional Development

Three credits.

Exploration of careers that involve researching and thinking about politics. Required for 5th Year M.A. students. Does not fulfill Methods or Subfield course requirements for POLS Ph.D. students.

5630. Prospectus and Dissertation Writing Seminar

Variable (1-3) credits. May be repeated for a total of 10 credits.

Writing workshop facilitates prospectus and dissertation writing. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5700. Proseminar in Politics and Popular Culture

Three credits.

Intersections of politics and popular culture. Examination of cultural texts for political meaning and for dialogue with academic political science.

5710. Political Science Fiction

Three credits. Prerequisite: Not open for credit to students who have passed POLS 3710.

International relations theory and speculative fiction as interpretations and interrogations of war, peace, politics, knowledge, and imagination.

5800. Race in the Formation of the Human Sciences

(Also offered as ANTH 5800, LLAS 5800, and PHIL 5800.) Three credits. Prerequisite: Not open for credit to students who have passed PHIL 5380.

Exploration of how race and the human sciences emerged out of the theological, epistemological, and political upheavals that resulted in the Euromodern world.

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 total of 6 credits.

Research in quantitative applications to political data.

Polymer Science and Engineering (POLY)

5098. Variable Topics in Polymer Science

Variable (1-3) credits. May be repeated for a total of 12 credits.

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 mechanism, 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 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.

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.

Presentations by invited guest speakers on topics of current interest in various areas of Polymer Science and Engineering. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Psychological Sciences (PSYC)

5100. History of Psychology

Three credits. Prerequisite: Open to Psychology graduate students, others with permission.

Intellectual antecedents to contemporary clinical, developmental, experimental, and social psychology.

5101. Motivation

(Also offered as COMM 5101.) Three credits.

Theories of motivation considered in relation to their supporting data.

5104. Foundations of Research in the Psychological Sciences I

Three credits. Prerequisite: Open to graduate students in Psychological Sciences, 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 to graduate students in Psychological Sciences, others by 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.

5107. Statistical Analysis of Neural Data

Three credits. Prerequisite: Open to graduate students; advanced undergraduates with instructor consent. Not open to students who have passed PSYC 5270 when offered as Statistical Analysis of Neural Data.

Practical introduction to the analysis of neural data. Lectures and problem sets will involve programming in Matlab, R, or Python. Course is suitable for students with a background in either quantitative methods or neuroscience.

5120. Health Psychology

Three credits.

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 STAT 5105 or equivalent statistics course.

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.

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.

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,

neuropsychology and cognitive/emotional function and dysfunction.

5141. Neuropsychological Assessment

Three credits. Prerequisite: PSYC 5140.

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 to graduate students in PSYC, SLHS, PNB; others with consent of instructor.

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. 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 a total of 12 credits.

May be repeated for up to 12 credits with change in content.

5200. Behavioral Neuroscience Research Seminar

Two credits. May be repeated for a total of 8 credits.

Seminar on current research, with intra- and extra-mural colloquium speakers.

5228. Neuropsychopharmacology

Three credits.

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.

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.

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. May be repeated for 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.

May be repeated for credit with a change in topic.

5285. Neurobiology of Aging: Changes in Cognitive Processes

Three credits.

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 to graduate students in Clinical Psychology and others with consent. May be repeated for a total of 12 credits.

Advanced seminar presentations by faculty, graduate students, and visiting speakers on current theoretical developments and empirical research in clinical psychology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5301. Practicum in Interviewing and Cognitive Assessment

Three credits. Prerequisite: Open to graduate students in Clinical Psychology and others with consent.

An introduction to psychological assessment with supervised practice in administering and interpreting clinical interviews and psychological tests.

5302. Adult Psychopathology

Three credits. Prerequisite: Open to graduate students in Clinical Psychology and others with consent.

Theoretical and descriptive overviews of mental disorder that afflict adults, emphasizing etiology, diagnosis, and conceptualization.

5303. Developmental Psychopathology

Three credits. Prerequisite: Open to graduate students in Clinical Psychology and others with consent.

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 to graduate students in Clinical Psychology and others with consent.

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 to graduate students in Clinical Psychology and others with consent.

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 to graduate students in Clinical Psychology and to others with consent.

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 to graduate students in Clinical Psychology.

Overview of multiple intervention models for therapy with children and families.

5332. Research Design and Test Construction

Three credits. Prerequisite: Open to graduate students in Clinical Psychology and others with consent.

Theoretical issues and practical problems in developing valid measures of personality variables and in designing experimental and quasiexperimental research.

5344. The History and Systems of Psychology

One credit. Prerequisite: PSYC 5307; open to graduate students in Clinical Psychology.

An overview of the trends in philosophy and early psychology that shaped the present course of the discipline.

5370. Current Topics in Clinical Psychology

Variable (1-3) credits. Prerequisite: Open to graduate students in Clinical Psychology and others with consent. May be repeated for credit.

5371. Special Topics in Clinical Psychology

Three credits. May be repeated for a total of 12 credits.

5399. Clinical Psychology Research Group

One credit. Prerequisite: Open only to graduate students in Clinical Psychology. May be repeated for a total of 12 credits.

Discussion of ongoing research of faculty and graduate students.

5400. Research Seminar in Developmental Psychology

One credit. Prerequisite: Open only to graduate students in Psychology. May be repeated for a total of 12 credits.

Current research in developmental psychology, with intra- and extramural speakers and directed readings.

5410. Advanced Developmental Psychology

Three credits.

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.

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 to Graduate students in PSYC, LING, SLHS; others with consent of instructor.

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 to Psychology graduate students, others with permission.

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 to graduate students in PSYC, LING, SLHS; others with consent of instructor.

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 to graduate students in PSYC, SLHS, PNB; others with consent of instructor. 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.

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.

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. 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.

5499. Research Team in Developmental Psychology

One credit. Prerequisite: Open to graduate students in Psychological Sciences, others with consent. May be repeated for a total of 12 credits.

Planning and execution of both individual and collaborative research projects in developmental psychology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5500. Research Seminar in Language and Cognition

One credit. May be repeated for a total of 12 credits. May be repeated for up to 12 credits.

5513. Memory

Three credits.

Contrasts associationist, cognitive, connectionist, and cognitive neuroscience approaches to issues involving short-term memory, long-term memory, and the representation of knowledge.

5514. The Mental Lexicon

Three credits. Prerequisite: Instructor consent.

The role of the mental lexicon in the perception and production of words, including the representation and use of knowledge about phonology, morphology, orthography, and semantics.

5515. Connectionist Models

Three credits.

Connectionist models in psychology and computational neuroscience. Topics include learning, memory, and language processes in both intact and damaged networks.

5516. Event Cognition

Three credits. Prerequisite: Open to graduate students and advanced undergraduates with instructor consent. Not open for credit to students who have passed PSYC 5570 when offered as Event Cognition.

An interdisciplinary examination of events as the fundamental unit of cognition. Event cognition and its relation to memory with reference to diverse methodologies in neuroscience, experimental cognition, and computation.

5553. Introduction to Nonlinear Dynamics

Three credits.

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.

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.

Psychological aspects of linguistic structure, with particular attention to phonology.

5570. Current Topics in Cognitive Science

Three credits. May be repeated for a total of 12 credits.

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.

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 Psychology 5571.

5574. Control and Coordination of Action

Three credits.

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. May be repeated for a total of 12 credits.

Current research and practice in industrial/organizational psychology, with intra- and extramural speakers. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5611. Work Motivation

Three credits. Prerequisite: PSYC 5613.

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.

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 Industrial/Organizational psychology, 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 Industrial/Organizational Psychology, 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 Industrial/Organizational Psychology, 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 Industrial/Organizational Psychology, 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.

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.

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 which 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.

The basis, in theories of perception and learning, for design of complex human-machine systems.

5670. Current Topics in Industrial/Organizational Psychology

Three credits. 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.

May be repeated for credit with a change in topic.

5699. Research Team in Industrial/Organizational Psychology

Variable (1-3) credits. Prerequisite: Admission to a graduate degree program in Psychology. May be repeated for a total of 24 credits.

Planning and execution of both individual and collaborative research projects in industrial/organizational psychology. This course may be repeated for credit. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5700. Proseminar in Social Psychology

One credit. Prerequisite: Open to Social Psychology graduate students, others with consent. May be repeated for a total of 10 credits.

Presentations on current research in all areas of social psychology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5701. Experimental Social Psychology

Three credits.

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 to Social Psychology graduate students, 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. 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. May be repeated for credit.

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.

May be repeated for credit with a change in topic.

5799. Research Team in Social Psychology

Variable (1-3) credits. May be repeated for a total of 12 credits.

Planning and execution of both individual and collaborative research projects in social psychology. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5800. Research in Psychology

Variable (1-6) credits. May be repeated for credit.

5801. Independent Study in Psychology

Variable (1-6) credits. May be repeated for credit.

6136. Seminar in Quantitative Research Methods

Three credits.

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, PSYC 5140, and PSYC 5141. May be repeated for a total of 24 credits.

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 a total of 24 credits.

Supervised clinical training in a community facility. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6301. Practicum in Adult Psychotherapy

Variable (1-3) credits. Prerequisite: Open to graduate students in Clinical Psychology and others with consent. May be repeated for a total of 15 credits.

Supervised psychotherapy training with adults including diagnostic procedures. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6302. Practicum in Child Psychotherapy

Variable (1-3) credits. Prerequisite: Open to graduate students in Clinical Psychology and others with consent. May be repeated for a total of 15 credits.

Supervised psychotherapy training with children and parents including diagnostic procedures. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6303. Didactics of Supervision and Consultation

Three credits. Prerequisite: PSYC 5301, 5304, 6301, and 6302; open to students in Clinical Psychology. May be repeated for a total of 6 credits.

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 to students in Clinical Psychology. May be repeated for a total of 12 credits.

Supervised training in supervising psychodiagnostic and psychotherapeutic activities of less advanced clinical psychology students.

6310. Internship in Clinical Psychology

Zero credits.

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 to Psychology graduate students, others with permission.

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.

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.

6782. Cross-Cultural Psychology

Three credits.

Cultural issues in human behavior and thought including topics on self, emotion, language, work, society, relationships, and health.

6783. Tools to Analyze Language

Three credits.

Focus on the applied use of text analysis tools to analyze the links between natural language and psychological processes.

Public Health (PUBH)

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. Prerequisite: Open only to Master of Public Health (MPH) and Foundations of Public Health Certificate students; others with department consent.

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. Prerequisite: Open only to Master of Public Health (MPH) and Foundations of Public Health Certificate students; others with department consent.

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. Prerequisite: Open only to Master of Public Health (MPH) and Foundations of Public Health Certificate students; others with department consent.

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. Prerequisite: Open only to Master of Public Health (MPH) and Foundations of Public Health Certificate students; others with department consent.

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

Three credits. Prerequisite: Four foundational courses from PUBH 5403, 5404, 5405, 5406, 5408, or 5409. Recommended preparation: PUBH 5431. May be repeated for a total of 6 credits.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5408. Introduction to Epidemiology and Biostatistics I

Three credits. Prerequisite: Open only to Master of Public Health (MPH) and Foundations of Public Health Certificate students; others with department 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 Master of Public Health (MPH) or Foundations of Public Health Certificate students; others with department 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.

5411. Introduction to Interprofessional Public Health Practice

Three credits. Prerequisite: Open only to Master of Public Health (MPH) students; others with department consent.

This course, taken near the beginning of a student's matriculation toward the Master of Public Health (M.P.H.) degree, presents theories and models of successful interprofessional public health practice. It draws on a competency-focused, case-based pedagogy to facilitate student engagement as they gain skills needed for effective collaborations with community-based practitioners and other stakeholders in addressing system-level population health concerns.

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. Prerequisite: Open only to Master of Public Health (MPH) students; others with department consent.

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 nonsocomial 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 which 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. Prerequisite: 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 co-morbidities. 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: Two of PUBH 5478, 5479, and 5480, one of which may be taken concurrently, or 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 a total of 15 credits.

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. May be repeated for a total of 9 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.

5501. Foundations of Public Health and Disability

Three credits. Prerequisite: Open only to 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 Disability Studies in Public Health Certificate. 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.

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.

A doctoral-level independent study course for Ph.D. students who wish to pursue special topics in advanced public health sciences under faculty supervision.

6496. Public Health Doctoral Seminar: Scholarship and Professional Development

Three credits. Prerequisite: Advanced graduate students in public health with at least 30 credits in coursework toward doctoral degree including Intermediate Epidemiology or Intermediate Biostatistics; familiarity with a software analysis package; instructor consent required.

This seminar is a comprehensive survey course exposing pre-candidate doctoral students to a number of advanced methodological topics in public health research and practice as well as ethical conduct in research (e.g., authorship criteria) and career considerations (e.g., range of employment opportunities, grant-writing process, pedagogical theory and practices). In addition to class lectures, students will gain experience in presenting research ideas for critique by faculty and fellow students. Specifically, the term project will be a longitudinal exercise to develop a Specific Aims Page or an outline for a manuscript; both augmented with preliminary data. At the end of the semester, students will present a 15-20 minute talk on their project to the full Public Health program of students, faculty and staff. Each class session will be split between content delivered by faculty and weekly progress reports on the term projects, with slightly more time allocated for discussion of the latter. In addition to topical material presented by the Co-Instructors, guest faculty periodically will present information about their research, career paths, etc.

Public Policy (PP)

5300. Independent Study

Variable (1-6) credits. May be repeated for a total of 24 credits.

5301. Special Readings in Public Policy

Variable (1-6) credits. May be repeated for a total of 24 credits.

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.

5304. Public Policy, Diversity, and Inclusion

Three credits.

Overview of how laws and policies related to diversity and inclusion have evolved from equal employment opportunity and affirmative action, to diversity and inclusion. Topics include measurement of racial or gender bias; measurement of "diversity"; policies that organizations used to achieve diversity; policies to maintain diversity and achieve inclusion.

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 PP 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 Government Contracting

Three credits.

Introduction to writing for private grants and government contracts. Includes responding to requests for proposals for government and nonprofit service provision as well as writing and managing a formal proposal preparation.

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.

5329. Nonprofit Advocacy, Government Relations, and Law

Three credits.

Legal landscape of nonprofit organizations; theory and application of effective tactics and approaches to advocacy and government relations by nonprofit organizations.

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.

5335. Nonprofit Marketing and Stakeholder Communications

Three credits.

Approaches for creating effective nonprofit stakeholder communications and marketing plans to promote the mission and service of the organizations.

5336. Fund Development and Nonprofit Sustainability

Three credits.

Core elements of developing a fund development (revenue) strategy for nonprofit organizations, including common revenue models, philanthropic models, and earned-income methods for funding organizational sustainability.

5337. Economics of Education Reform

(Also offered as EDLR 6322.) Three credits.

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.

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.

5346. Child and Family Policy

Three credits. Prerequisite: Not open for credit to students who have passed PP 4346.

Theory and practice of child and family policy. Topics may include marriage and divorce, fertility, employment, and human capital.

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.

5348. Urban Planning Principles and Methods

Three credits.

Introduction to the urban planning process, including commonly used planning topics, practices, and tools that planners need to professionally conduct their tasks. Lectures, discussion and simulated planning projects.

5349. Public Procurement and Contracting

Three credits.

Principles of contract formulation and administration in public procurement, including practices in procurement activities from the identification of the need through the close out of contract activities; best practices for effective contracting relationships between the public and private and nonprofit sectors.

5350. Urban and Regional Policy

Three credits. Recommended preparation: PP 5331 and 5375.

Theories and empirical analyses related to urban and regional policy challenges. Students will develop skills in employing analytical frameworks and empirical techniques to investigate urban and regional policy issues.

5359. Crisis Management

Three credits. Prerequisite: Not open for credit to students who have passed PP 5397 when offered as Crisis Management. Recommended preparation: PP 5361.

Overview of types and characteristics of crises, their impacts and challenges, and strategies for managing them. Topics include emergency management policy and doctrine, incident management systems, individual preparedness, and community resilience.

5361. Theory and Management of Public Service 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. Local Government Management and Leadership

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.

5366. Public Service Executive Leadership

Three credits.

Theory and application of tactics and techniques used to enhance effective leadership and strategic management.

5368. Performance Management and Accountability

Three credits.

Logic and application of measurement to managing the performance of programs. Topics include performance frameworks, including program logic models and results-based accountability, and performance data visualizations and dashboards.

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.

Provides a synthesis of basic skills and competencies important for future professionals in the public service. This is a required MPA and MPP course. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

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.

5374. Topics in Financial Management

Three credits. Prerequisite: Not open for credit to students who have passed PP 5397 when offered as Topics in Governmental Financial Management.

Synthesizes the lessons in public sector financial management as they apply to the professional practice of the chief financial officer. Combines research literature, expert testimony, professional association position papers, cases, documentaries and discussion in order to expose students to the subject matter and the decision demands of leaders in this field.

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 I

Three credits. Prerequisite: Open only to Master of Arts in Survey Research or Graduate Certificate in Survey Research students, department consent required.

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. Principles and Methods of Survey Research II

Three credits. Prerequisite: Open only to Master of Arts in Survey Research or Graduate Certificate in Survey Research students, department consent required.

Advanced exploration of the practice of survey research and questionnaire design.

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.

5388. An Introduction to Multipopulation Survey Research Methods

Three credits. Prerequisite: Open only to Master of Arts in Survey Research or Graduate Certificate in Survey Research students, department consent required.

Methods for designing multilingual and multicultural survey research projects as well as key considerations for designing multinational surveys, including sampling, questionnaire design, fielding, data interpretation and analysis.

5389. Capstone on the Future of Survey Research

Three credits. Prerequisite: Department consent. Recommended preparation: student is in the last or next to last semester of study in the Master of Arts in Survey Research program.

Capstone research on problems and opportunities in the survey research industry for students nearing completion of the Master of Arts in Survey Research program.

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 credit.

Experience in a public organization under competent supervision. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5397. Special Topics in Public Policy

Variable (1-6) credits. May be repeated for a total of 24 credits.

Research (Social Work) (RSCH)

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. Advanced Research: Program Evaluation

Three credits. Prerequisite: BASC 5333 or Advanced Standing; open only 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 only to Social Work M.S.W. students.

Variable topics in research methodology that provides advanced skills and knowledge for social work practice. Topics include applied qualitative research, participatory action research, historical methods, and statistics in social work research.

Romance Language (ROML)

5395. Applied Linguistics for Teachers of Romance Languages

Three credits.

Social Work (SSW)

6400. Social Work Doctoral Program Independent Study

Three credits. Prerequisite: Open only to Social Work Doctoral Program students. May be repeated for a total of 6 credits.

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 to doctoral students in Social Work, others with permission.

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 which may be taken concurrently; open to doctoral students in Social Work, 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

Four credits. Prerequisite: SSW 6410, which may be taken concurrently; open to doctoral students in Social Work, others with permission.

Builds upon an introductory level of statistical knowledge and assumes that students 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.

6413. Research IV: Multivariate Statistics II

Four credits. Prerequisite: SSW 6412; open to doctoral students in Social Work, 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.

6414. Research V: Qualitative Research Methods

Three credits. Prerequisite: SSW 6410; SSW 6411, which may be taken concurrently; open to doctoral students in Social Work, 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.

6415. Topics in Advanced Social Work Research

Three credits. Prerequisite: SSW 6410; open only to doctoral students in Social Work, others with permission.

Advanced content on variable topics in social work research. Offers advanced conceptual understanding of skills used in complex research design, measurement, and or/analysis. Topics may include mixed methods research, advanced translational research, advanced quantitative analysis, advanced qualitative analysis, or other specialized research methods critical to the field of social work.

6420. Critical Analysis of Historical and Philosophical Themes of the Profession

Three credits. Prerequisite: Open to doctoral students in Social Work, others with permission.

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.

6425. Social Welfare Policy Seminar

Three credits. Prerequisite: Open to doctoral students in Social Work, others with permission.

Focuses on the concepts, methods, and practices of analysis of social welfare policies designed to address social problems in the United States. Students are expected to apply social science research training and critical thinking skills to study

the ideological and socioeconomic contextual backgrounds of social problems, social policies, and policy analyses and evaluate various alternatives to problem definitions, policy strategies, and types of policy analysis. Helps students develop advanced skills in analyzing and critiquing social welfare policies and programs, making recommendations for change, and effectively communicating the results of their work.

6435. Social and Behavioral Science: Knowledge Base for Social Work Practice with Smaller Target Systems

Three credits. Prerequisite: Open to doctoral students in Social Work, others with permission.

Helps students understand the 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. Explores the 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.

6445. Social and Behavioral Science: Knowledge Base for Practice with Large Target Systems

Three credits. Prerequisite: Open to doctoral students in Social Work, others with permission.

Provides 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. Explores 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.

6451. Dissertation Preparation Seminar

Three credits. Prerequisite: Open to doctoral students in Social Work, others with permission.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6460. Teaching and Learning in Social Work Education: Roles and Contexts

Three credits.

This three-credit course, offered in the fall semester following completion of the Comprehensive Examination, is designed to prepare students for the multiple roles of social work educators. The course explores historical and contemporary pedagogical theories, approaches and strategies within a social justice framework. Students will have opportunities to observe master teachers, develop guest lectures, and/or provide faculty liaison to the field. Students will develop teaching philosophy statements for their job search portfolios.

Social Work Elective (SWEL)

5310. Services to Immigrants and Refugees and Cross-Culture Helping

Three credits. Prerequisite: Open to students in both the MSW program and the 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.

5315. Gender and Social Work: Feminist Theory and Practice

Three credits. Prerequisite: Open to students in both the MSW program and the STEP program.

This course examines gender issues, social and cultural assumptions about women, and the socialization practices that continue them. Topics include major social forces and ideologies, such as oppression, patriarchy, sexism, feminism, and intersectionality, as well as psychological theories about gender. The course also addresses feminist perspectives on social work practice with women related to such issues as sexual and intimate partner violence, reproductive issues and women's health, and body image.

5317. Women, Children, and Families: Social Policies and Programs

Three credits. Prerequisite: Open to students in both the MSW program and the 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 MSW 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 to students in both the MSW program and the 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 to students in both the MSW program and the STEP program.

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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the 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 to students in both the MSW program and the STEP program. May be repeated for a total of 4 credits.

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 to students in both the MSW program and the 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.

Sociology (SOCl)

5001. Proseminar

One credit.

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. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

5003. Teaching Sociology

Variable (1-3) credits. Prerequisite: Open only to graduate students in Sociology.

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.

5005. Writing Sociology

Three credits. Prerequisite: Instructor consent.

Further the development of students' sociological writing skills and enhances their ability to generate clear, concise and effective sociological arguments and analysis through engaged discussion of writing goals and strategies, instructor feedback, and peer review.

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.

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. May be repeated for a total of 9 credits.

Special topics in quantitative methods in sociological research. Topics will vary by semester.

5231. Qualitative Research I

Three credits. Prerequisite: Open only to Sociology graduate students; others with instructor consent.

Introduction to qualitative methods of social research. Topics include contemporary theoretical and epistemological debates; ethical issues; and exploration of the diverse traditions approaches of qualitative research. Discussion of different strategies for conducting fieldwork, interviewing, and textual, virtual, and archival research. Hands on approaches to gathering data and addressing the relationships between theory, methods of analysis, and data collection; and introduction to a variety of perspectives on writing, narrative, and analytic strategies.

5235. Topics in Qualitative Methods

Three credits. May be repeated for a total of 9 credits.

Special topics in qualitative methods in sociological research. Topics will vary by semester.

5251. Core Theorists

Three credits.

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. May be repeated for a total of 9 credits.

Special topics in sociological theory. Topics will vary by semester.

5275. Topics in Culture

Three credits. May be repeated for a total of 9 credits.

Special topics in sociological theory and research in culture. Topics will vary by semester.

5315. Topics in Deviance and Crime

Three credits. May be repeated for a total of 9 credits.

Special topics in sociological theory and research in deviance and crime. Topics will vary by semester.

5411. Sociology of Work

Three credits.

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.

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. May be repeated for a total of 9 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. May be repeated for a total of 6 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. May be repeated for a total of 9 credits.

Special topics in sociological analyses of racism and ethnic group relations. Topics will vary by semester.

5515. Sociology of Immigration

Three credits.

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.

5525. Race, Immigration, and Reproduction

(Also offered as LLAS 5525.) Three credits.

This interdisciplinary course considers intersections of race, immigration, and reproduction within the United States and in a transnational context.

5601. Gender and Society

Three credits. May be repeated for a total of 6 credits.

Critical appraisal of social scientific perspectives on women and men. Feminist theory and current social science research on gender. Emphasis on interdisciplinary approaches.

5602. Gender in Global Perspective

(Also offered as WGSS 5602.) Three credits. Prerequisite: Instructor consent.

Debates surrounding "established" concepts such as gender, feminism, intersectionality, and postcolonial, as well as the situated contexts within which these concepts are redefined, debated, and institutionalized. Analysis of literature from Africa, Latin America, and South Asia on the politics of knowledge, violence, development and human rights.

5604. Sociology of Sexualities

(Also offered as WGSS 5604.) Three credits. Prerequisite: Instructor consent.

Explores social organization, construction, and politics of sexualities with a particular focus on lesbian, gay, bisexual, transgender, and queer (LGBTQ) experiences and the intersection of sexualities, gender, race, age, and class. How institutions, identities, and discourses interact with, are regulated by, and produce sexual meanings and social and political inequalities.

5605. Topics in Gender and Sexualities

Three credits. May be repeated for a total of 9 credits.

Special topics in sociological theory and research in gender and sexualities. Topics will vary by semester.

5612. Feminist Theory and Social Science

(Also offered as WGSS 5612.) Three credits.

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.

5613. Theories of Intersectionality

(Also offered as WGSS 5613.) Three credits.

Analyses of theories that simultaneously take into account dynamics of race, class, gender, sexuality, nation, ability, and other dimensions of social inequality and difference. How scholars research intersectionality, the limits and possibilities of different approaches, and the types of methodologies that are most effective for intersectional analysis.

5614. Sexual Citizenship

(Also offered as WGSS 5614.) Three credits.

Sexuality as an axis of citizenship in diverse national and international contexts. Analysis of access to citizenship, relationship recognition, marriage rights, heteronormativity and compulsory heterosexuality, trans citizenship claims, immigration, asylum, sex work, reproductive rights, sex education, racism and racialization, colonialism, and social justice.

5651. Seminar in the Family

Three credits.

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.

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.

Topics in urban sociology.

5751. Demography

Three credits.

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.

The sources and characteristics of demographic data and vital statistics and the methods and problems of population data analysis.

5801. Political Sociology

Three credits.

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. May be repeated for a total of 9 credits.

Special topics in sociological theory and research in political sociology. Topics will vary by semester.

5821. Social Movements

Three credits.

Analysis of the conditions and processes underlying movement formation and participation and influencing their careers and outcomes.

5825. Sociology of Human Rights

(Also offered as HRTS 5825.) Three credits. Prerequisite: Instructor consent.

Critical sociological perspective on human rights, with a specific emphasis on power, inequalities, and people's struggles to claim and access political, civil, economic, social and cultural human rights.

5833. Gender, Politics and the State

Three credits.

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. May be repeated for a total of 15 credits.

A seminar course. Topics vary by semester.

5899. Independent Study for Graduate Students

Variable (1-6) credits. May be repeated for credit.

Special topic readings or investigations.

6005. Advanced Topics in Sociology

Three credits. May be repeated for a total of 9 credits.

Advanced topics in sociological analysis. Topics will vary by semester.

6203. Quantitative Research II

Three credits.

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. May be repeated for a total of 9 credits.

Advanced topics in quantitative methods in sociological research. Topics will vary by semester.

6231. Qualitative Research II

Three credits. Prerequisite: SOCI 5231 or equivalent; open to master's and doctoral students in sociology, others with instructor consent.

Advanced topics in qualitative methods of social research. Further interrogation of topics including contemporary theoretical and epistemological debates in qualitative methodology; continued exploration of ethical issues and diversity of traditions in conducting fieldwork, interviewing, and analysis of virtual, and archival research. Hands-on approaches to gathering data and addressing the relationship between theory, analysis, and data; and introduction to a variety of perspectives on writing and narrative analysis.

6251. Current Theory and Research

Three credits. Prerequisite: SOCI 5251.

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. May be repeated for a total of 9 credits.

Advanced topics in qualitative methods in sociological research. Topics will vary by semester.

6265. Advanced Topics in Sociological Theory

Three credits. May be repeated for a total of 9 credits.

Advanced topics in sociological theory. Topics will vary by semester.

6275. Advanced Topics in Culture

Three credits. May be repeated for a total of 9 credits.

Advanced topics in sociological theory and research in culture. Topics will vary by semester.

6315. Advanced Topics in Deviance and Crime

Three credits. May be repeated for a total of 9 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. May be repeated for a total of 9 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. May be repeated for a total of 9 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. May be repeated for a total of 9 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. May be repeated for a total of 9 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. May be repeated for a total of 9 credits.

Advanced topics in sociological theory and research in political sociology. Topics will vary by semester.

6825. Topics in the Sociology of Human Rights

(Also offered as HRTS 6825.) Variable (3-9) credits. Prerequisite: Instructor consent. May be repeated for a total of 9 credits.

Topics in sociological theory and research in human rights. Topics will vary by semester. May be repeated to a maximum of nine credits.

Spanish (SPAN)

5320. Independent Study

Variable (1-6) credits. 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 9 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 9 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 9 credits.

Open topics.

6402. Studies in Spanish-American Literature

Three credits. May be repeated for a total of 9 credits.

6403. Studies in Spanish Literature

Three credits. May be repeated for a total of 9 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 9 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 9 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 9 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 9 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 9 credits.

Aspects of methodology, theory, and history relevant to the study of cultural production in Hispanic societies.

Special Topics (Social Work) (SPTP)

5318. Special Topics

Variable (1-3) credits. Prerequisite: Open to students in the MSW program. May be repeated for a total 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.

Speech, Language and Hearing Science (SLHS)

5123. Bilingualism in Typical and Atypical Populations: Language and Cognition

Three credits. Recommended preparation: A course in phonetics, language development and disorders. Not open to students who have passed SLHS 4123.

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.

5192. Practicum in Aphasia

One credit. Recommended preparation: SLHS 4245. May be repeated for a total of 4 credits.

Clinical methods of treatment of aphasia; goal-setting, assessment, communication facilitation, and the writing of SOAP notes.

5282. Clinical Practicum in Speech Language Pathology

Variable (1-3) credits. Prerequisite: Open to students in the Speech, Language, and Hearing Sciences M.A. program. May be repeated for a total of 24 credits.

Under close supervision by a state licensed and American Speech Language Hearing Association clinically certified speech language pathologist, graduate students will participate as a member of the health care team to provide speech, language and swallowing assessment and management to patients across the lifespan. Clinical practicum allows speech language pathology graduate students to develop and demonstrate clinical and professional knowledge and skills in the assessment and management of speech, language and swallowing disorders through direct patient care. The course is held on and/or off campus at individually assigned clinical facilities. Students taking this course will be assigned a grade of S (satisfactory) or U (unsatisfactory). May be repeated for a total of 24 credits. Formerly offered as SLHS 5336.

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.

The etiology, pathophysiology, methods for identification, and management of acquired and post-congenitally identified disorders of the auditory system. Prepares students to meet the requirements of the national standards for earning a license to practice clinical audiology and to demonstrate excellence in the diagnosis

and management of auditory disorders in clinical practice.

5322. Electrophysiology Techniques and Interpretation I

Four credits.

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

Variable (1-3) credits. May be repeated for a total of 6 credits.

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. May be repeated for credit with a change of topic to a maximum of six credits.

5328. Intermediate Clinical Topics in Audiology

Variable (1-3) credits. May be repeated for a total of 6 credits.

Intermediate-level topics in providing clinical audiology services with a focus on prevention and intervention; supports ongoing clinical practicum. May be repeated for credit with a change of topic to a maximum of six credits.

5329. Advanced Clinical Topics in Audiology

Variable (1-3) credits. May be repeated for a total of 12 credits.

Integrating advanced diagnostic and treatment topics with evidence-based practice through presentations and case studies. May be repeated for credit with a change in topic. May be repeated for credit with a change of topic to a maximum of 12 credits.

5335. Fluency Disorders

Two 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.

5342. Aphasia

Two 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

Two 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

Two 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

Two 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

Two 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

Two credits.

Generation, transmission, detection, and analysis of the speech signal. Special attention is given to 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

Variable (1-2) 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.

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: Open to grad students, others with instr. consent. Recommended prep: course in normal language development and disorders in preschool and school-age children. Not open for credit to students who have passed SLHS 4376.

A research seminar covering the theories, assessment, and treatment of children with reading disabilities from a language-based perspective.

5377. Introduction to Research

Three credits.

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 to second year SLHS MA program students, others with permission.

Addresses the etiologies associated with severe communication impairments and related physical and/or cognitive-linguistic challenges; instructs on the basic principles of AAC assessment and procedures; identifies potential AAC users, appropriate selection of symbols and vocabulary for no, low, mid and/or high-technology systems, seating and positioning, and access; and instructs on the principles of intervention and implementation of AAC systems within the clinic, school, medical, home and community settings across the lifespan.

5379. Introduction to Medical Speech Pathology 1

One credit. Prerequisite: Intended for first year graduate students currently enrolled in the SLHS MA 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 currently enrolled in the SLHS MA 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 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 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.

5482. Clinical Practicum in Audiology

Variable (1-3) credits. Prerequisite: Open to students in the AuD program. May be repeated for a total of 24 credits.

Under close supervision by a licensed audiologist, students will participate as a member of the health care team to provide audiologic assessment and management to patients across the lifespan. Clinical practicum allows audiology graduate students to develop and demonstrate clinical and professional knowledge and skills in the assessment and management of hearing and balance through direct patient care. The course is held on and/or off campus at individually assigned clinical facilities. Formerly offered as SLHS 5337. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

6300. Independent Study in Communication Disorders

Variable (1-6) credits. May be repeated for a total of 18 credits.

Periodic conferences with the instructor are required.

6319. Practicum in Research

Variable (1-6) credits. May be repeated for a total of 24 credits.

Practicum. May be repeated for credit.

6366. Seminar in Hearing Science

Variable (1-6) credits. May be repeated for a total of 24 credits.

6367. Topics in Hearing and Speech Science

Variable (1-3) credits. May be repeated for a total of 24 credits.

6368. Topics in Speech Pathology

Variable (1-3) credits. May be repeated for a total of 12 credits.

6369. Topics in Audiology

Variable (1-3) credits. May be repeated for a total of 15 credits.

6371. Seminar in Professional Skills for Speech, Language, and Hearing Sciences

Three credits. Prerequisite: Instructor consent. Not open for credit to students who have taken SLHS 6367 when offered as "Graduate Survival Skills for Speech, Language, and Hearing Sciences."

Preparation for academic and industry careers in speech, language, and hearing sciences, including grant-writing, service duties such as reviewing, scientific ethics and rigor, and mentorship.

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 to Doctor of Audiology students, others with instructor consent.

Anatomy, physiology and functional assessment of the vestibular system including instrumentation, procedures, and interpretation of clinical tests. Hands-on laboratory exercises included.

6422. Electrophysiological 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.

Statistics (STAT)

5005. Introduction to Applied Statistics

Three credits. Prerequisite: Not open 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. STAT 5005 cannot be counted toward a graduate degree in Statistics or Biostatistics.

5095. Investigation of Special Topics

Variable (1-3) credits. May be repeated for a total of 3 credits.

Topical seminar course. May be repeated for a maximum of three credits with a change of topic.

5105. Quantitative Methods in the Behavioral Sciences

Three credits. Prerequisite: Open to graduate students in Statistics, others with permission.

Acquaints the student with the application of statistical methods in the behavioral sciences. Correlational methods include multiple regression and related multivariate techniques.

5125. Statistical Computing for Data Science

Three credits. Prerequisite: Instructor consent and introductory course in mathematical and applied statistics; introductory course in programming.

Principles and practice of statistical computing in data science: data structure, distributed computing and project management tools, data visualization, and data programming including simulation, resampling methods, and applications of optimization for statistical modeling, inference, and prediction.

5192. Supervised Research in Statistics

Variable (1-6) credits. Prerequisite: Open to graduate students in Statistics, others with permission.

5215. Statistical Consulting

(Also offered as BIST 5215.) Three credits. Prerequisite: BIST/STAT 5315, 5505, and 5605; 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: BIST/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.

5255. Introduction to Data Science

Three credits. Prerequisite: Open to graduate students in Statistics, others with permission. Not open for credit to students who have passed STAT 3255. Recommended preparation: STAT 1000Q or 1100Q or 5005 or equivalent; STAT 2255 or equivalent; and STAT 3115Q or equivalent.

Introduction to data science for effectively storing, processing, visualizing, analyzing and making inferences from data to enable decision making. Topics include project management, data preparation, data visualization, statistical modeling, machine learning, distributed computing and ethics.

5315. Analysis of Experiments

Three credits. Prerequisite: STAT 5005. Not open to students who have passed STAT 3115Q.

Graded Straight-line regression, multiple regression, regression diagnostics, transformations, dummy variables, one-way and two-way analysis of variance, analysis of covariance, stepwise regression. STAT 5315 cannot be counted toward a graduate degree in Statistics or Biostatistics.

5361. Statistical Computing

Three credits. Prerequisite: Open to graduate students in Statistics, others with permission.

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.

5405. Applied Statistics for Data Science

Three credits. Prerequisite: Instructor consent and undergraduate course in statistics. Not open to students who have passed STAT 5505 or STAT 5605 or BIST 5505 or BIST 5605.

Statistics essential for data science incorporating descriptive statistics; integrative numerical description and visualization of data; graphical methods for determining and comparing distributions of data; data-driven statistical inference of one-sample, two-sample, and k-sample problems; linear regression; non-linear regression; and dependent data models.

5415. Statistical Methods for Data Science

Three credits. Prerequisite: Differential calculus; undergraduate course in statistics; and Instructor consent. Not open to students who have passed STAT 5585 or STAT 5685 or BIST 5585 or BIST 5685.

Basic probabilistic concepts; marginal, joint and conditional probability distributions; point and interval estimation; and hypothesis testing.

5505. Applied Statistics I

(Also offered as BIST 5505.) Three credits. Prerequisite: Open to graduate students in Statistics and Biostatistics; others with permission.

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 statistics MA or PHD field of study. Not open 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

Three credits. Prerequisite: Open to graduate students in Statistics, others with permission.

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

Three credits. Prerequisite: 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 to graduate students in Statistics, others with permission.

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 5605.) Three credits. Prerequisite: BIST/STAT 5505.

Analysis of variance, regression and correlation, analysis of covariance, general liner models, robust regression procedures, and regression diagnostics.

5665. Applied Multivariate Analysis

Three credits. Prerequisite: Open to graduate students in Statistics, others with permission.

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

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: BIST/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.

5725. Linear Models I

Three credits. Prerequisite: Open to graduate students in Statistics, others with permission.

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.

5735. Linear Models II

Three credits. Prerequisite: STAT 5505, 5605, and 5725; open to Ph.D. students who have passed the Ph.D. Qualifying Exam in Statistics; others with permission.

Multiple comparisons, fixed effects linear models, random-effects and mixed-effects models, generalized linear models, variable selections, regularization and sparsity, support vector machines, additive models and Bayesian linear models.

5825. Applied Time Series

Three credits. Prerequisite: Open to graduate students in Statistics, others with permission.

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.

5845. Applied Spatio-Temporal Statistics

Three credits. Prerequisite: Open to graduate students in Statistics, others with permission. Recommended Preparation: STAT 5405 or 5605 or GEOG 5600 or 5610 or EARTH 5150 or equivalent.

Applied statistical methodology and computing for spatio-temporal data, including visualization, models, and inferences. Extreme value analysis in spatio-temporal contexts. Focus on models that account for spatio-temporal dependence and inferences that provide appropriate uncertainty measures, with applications to real-world problems using open-source software.

5915. Statistical Data Science in Action

Three credits. Prerequisite: STAT 5405 or instructor consent.

Real-world statistical data science practice: problem formulation; integration of statistics, computing, and domain knowledge; collaboration; communication; reproducibility; project management.

6315. Statistical Inference I

Three credits. Prerequisite: Open to Ph.D. students who have passed the Ph.D. Qualifying Exam in Statistics, others with permission.

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 to Ph.D. students who have passed the Ph.D. Qualifying Exam in Statistics, others with permission.

Fundamentals of measure and integration theory: fields, σ -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

Variable (1-6) credits. Prerequisite: Open to graduate students in Statistics, others with permission. May be repeated for a total of 24 credits.

6515. Statistical Inference II

Three credits. Prerequisite: STAT 6315; open to Ph.D. students who have passed the Ph.D. Qualifying Exam in Statistics, others with permission.

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.

6615. Statistical Learning and Optimization

(Also offered as BIST 6615.) Three credits. Prerequisite: Instructor consent and intermediate courses in mathematical and applied statistics.

Computationally intensive statistical learning methods with optimization techniques: classification, discriminant analysis, (generalized) additive models, boosting, regression trees, regularized regression, principal components, support vector machines, and (deep) neural networks.

6694. Seminar in Multivariate Statistics

Variable (1-6) credits. Prerequisite: Open to graduate students in Statistics, others with permission. May be repeated for a total of 12 credits.

6894. Seminar in the Theory of Probability and Stochastic Processes

Variable (1-6) credits. Prerequisite: Open to graduate students in Statistics, others with permission. May be repeated for a total of 12 credits.

Systems Engineering (SE)

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 a total of 15 credits.

General topics in systems engineering.

5101. Foundations of Physical Systems Modeling

Three credits. Recommended preparation: Undergraduate degree in ME, CHEG 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. Recommended preparation: competency in numerical analysis and programming language (MATLAB).

This course provides students with a thorough understanding of mathematical optimization and

uncertainty analysis for the robust design of cyber-physical systems. Topics include optimization theory and practice, uncertainty modeling, sensitivity analysis, and formal and classical model-based robust design methodologies.

5201. Embedded/Networked Systems Modeling Abstractions

Three credits. Recommended preparation: Background in hardware and/or software design. Not open to students who have passed SE 5301.

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: SE 5201.

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 Internet of Things

(Also offered as CSE 5312.) Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent. Recommended preparation: An undergraduate degree in electrical engineering, computer engineering, or computer science or completed a graduate level course in embedded or network systems.

This course is designed to provide students and professional engineers with a thorough understanding of the design, development, validation and evaluation of IoT systems, especially in industrial domains with stringent timing and performance requirements. The student will develop skills in specifying the requirements for the target IoT systems, selecting the appropriate hardware and software platforms, and validating and evaluating the system performance. Special emphasis will be placed on the semester-based industrial projects that will be designed from selected industrial domains to address real-life problems.

5502. Capstone Projects for Systems Engineering

Three credits. Prerequisite: SE 5001 or 5101 or 5102. Not open for credit to students who have passed SE 5195.

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.

5602. Machine Learning for Physical Sciences and Systems

(Also offered as CSE 5602.) Three credits. Prerequisite: Open to graduate students in Computer Science and Engineering, MEng in Advanced Systems Engineering, and MEng in Data Science, others with department consent. Recommended prep: Basic concepts in machine learning, linear algebra, optimization, statistics.

Foundational knowledge in applied aspects of machine learning, including methods for handling uncertain, small, and imbalanced data; feature selection and representation learning; and model selection and assessment. Students will also gain exposure to state-of-the-art research on interpretability of machine learning models, stability of machine learning algorithms, and meta-learning. Topics will be discussed in the context of recent advances in machine learning for materials, chemistry, and physics applications, with an emphasis on the unique opportunities and challenges at the intersection of machine learning and these fields.

5702. Data Science for Materials and Manufacturing

(Also offered as ME 5702 and MFG 5210.) Three credits. Prerequisite: Undergraduate degree in engineering or computer science, departmental or unit consent required. Recommended preparation: Knowledge or coursework in probability and statistics. Ability to read, interpret and modify Python and MATLAB code. Ability to use Python

and MATLAB for analyzing data for the course project.

This course will provide students with data analytics skills for knowledge discovery and design optimization. The students will also learn how to apply data mining and machine learning techniques to tackle the challenges in manufacturing and computational materials engineering. Topics include basic concepts of supervised/unsupervised learning, design of experiments and data collection, material image processing, surrogate modeling, optimization and model calibration, multi-fidelity modeling, and applications of data analytics in manufacturing and computational materials engineering problems.

5832. Embedded/Networked Systems Modeling Abstractions

(Also offered as CSE 5832.) Three credits. Prerequisite: Open to graduate students in the CSE program, others with consent.

Students will become 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. Use of software engineering tools (Rhapsody, Simulink, Stateflow and Simulink/MATLAB coder) in the embedded system design flows is emphasized.

Translation Studies (TRST)**5295. Special Topics**

Variable (1-6) credits. May be repeated for credit.

With a change in topic, may be repeated for a maximum of six credits.

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. May be repeated for a total of 9 credits.

A study of the theoretical and practical aspects of literary translation. Translating literature from various genres. May be repeated for a maximum of nine credits with a change of topic.

5311. Literary Translation Seminar

Three credits. Prerequisite: Six credits of upper division coursework 3000-level or higher in a foreign language or the equivalent. May be repeated for a total of 9 credits.

Translating literature and studying the practical aspects of the craft of literary translation. May be repeated for a maximum of nine credits with a change of topic.

5320. Portfolio Translation Seminar

Three credits. Prerequisite: TRST 5310 and 5311.

Translation of literature of any genre or period into English, working toward a final publishable text. Includes preparation of a conference-length paper related to translation theory or practice.

Women's, Gender, and Sexuality Studies (WGSS)**5119. Historical Women Political Thinkers**

(Also offered as POLS 5119.) Three credits. Recommended preparation: POLS 5100. Not open to students who have passed POLS/WGSS 3027/W.

Critical study of the writings of several historical women political thinkers.

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. May be repeated for a total of 9 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 Epistemologies and 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. May be repeated for a total of 24 credits.

5395. Special Topics Seminar in Women's, Gender, and Sexuality Studies

Three credits. May be repeated for a total of 9 credits.

Topics of current interest from a feminist perspective.

5398. Variable Topics in Women's, Gender, and Sexuality Studies

Three credits. May be repeated for a total of 9 credits.

With a change in topics, may be repeated for credit.

5410. Black Feminist Theory and Politics

(Also offered as POLS 5410.) 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.

5602. Gender in Global Perspective

(Also offered as SOCI 5602.) Three credits.
Prerequisite: Instructor consent.

Debates surrounding “established” concepts such as gender, feminism, intersectionality, and postcolonial, as well as the situated contexts within which these concepts are redefined, debated, and institutionalized. Analysis of literature from Africa, Latin America, and South Asia on the politics of knowledge, violence, development and human rights.

5604. Sociology of Sexualities

(Also offered as SOCI 5604.) Three credits.
Prerequisite: Instructor consent.

Explores social organization, construction, and politics of sexualities with a particular focus on lesbian, gay, bisexual, transgender, and queer (LGBTQ) experiences and the intersection of sexualities, gender, race, age, and class. How institutions, identities, and discourses interact with, are regulated by, and produce sexual meanings and social and political inequalities.

5612. Feminist Theory and Social Science

(Also offered as SOCI 5612.) Three credits.

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.

5613. Theories of Intersectionality

(Also offered as SOCI 5613.) Three credits.

Analyses of theories that simultaneously take into account dynamics of race, class, gender, sexuality, nation, ability, and other dimensions of social inequality and difference. How scholars research intersectionality, the limits and possibilities of different approaches, and the types of methodologies that are most effective for intersectional analysis.

5614. Sexual Citizenship

(Also offered as SOCI 5614.) Three credits.

Sexuality as an axis of citizenship in diverse national and international contexts. Analysis of access to citizenship, relationship recognition, marriage rights, heteronormativity and compulsory heterosexuality, trans citizenship claims, immigration, asylum, sex work, reproductive rights, sex education, racism and racialization, colonialism, and social justice.

5661. Feminist Approaches to Disability, Illness, and Care

Three credits.

An examination of care and caregiving across different threads of feminist scholarship in sociology, science and technology studies (STS), and disability studies. Key topics include how care is raced and gendered, disability as an axis of inequality, and how approaches to care have evolved, particularly in feminist disability studies/disability justice.