GRADUATE PROGRAM IN ENVIRONMENTAL RESOURCES ENGINEERING

The ERE Department offers three graduate degrees: the master of professional studies, the master of science, and the doctor of philosophy degrees. ERE graduate students apply science and engineering to the conservation, restoration, holistic development, and improved utilization of the natural environment and its related resources.

Applicants to all programs of study are required to have a bachelor's degree in science or engineering and are expected to have completed at least one 3-credit course in physics, one 3-credit course in statistics, and two 3-credit courses in calculus. Students admitted without the necessary background are required to take prerequisite courses that fulfill these baseline requirements by the department.

All graduate degrees in ERE require completion of at least 15 credit hours of graduate coursework in engineering and applied science courses. Program mastery courses may be satisfied by prior study. A seminar is strongly suggested. Plans of study are individualized by consultation with a student's academic advisor and graduate committee.

M.P.S in Environmental Resources Engineering

The Master of Professional Studies (M.P.S.) degree requires the successful completion of a minimum of 30 credits at the graduate level, of which at least 24 must be in coursework. A 3-6 credit comprehensive project or practicum completes the M.P.S. degree requirements.

M.S. in Environmental Resources Engineering

The Master of Science (M.S.) degree requires the successful completion of a minimum of 30 credits at the graduate level, of which 18-24 are for coursework and 6-12 credits are for the thesis.

Ph.D in Environmental Resources Engineering

The Doctor of Philosophy (Ph.D.) degree requires the successful completion of a minimum of 60 credits at the graduate level, of which 30-48 are for coursework and 12-30 credits are for the dissertation.

Research Areas/Areas of Practice

Within the degree programs, students can focus their coursework and research within three different areas of study (for MS and PhD degrees) and areas of practice (for MPS degree). These different areas of study and areas of practice entail: 1. course work pre-requisites or co-requisites in addition to the baseline calculus, statistics, and physics courses 2. Graduate level mastery courses.

Students that do not specify an area of practice or area of study complete prerequisite or co-requisite courses beyond the departmental baseline requirements in the general Environmental Resources Engineering area. This general coursework area includes at least one semester of study in thermodynamics, fluid mechanics, or statics; one semester of study in hydrology, chemistry, or biology; and one semester of study in computing methods or programming. The general Environmental Resources Area does not require specific mastery classes; mastery classes would be determined in consultation with the student's committee.

Ecological Engineering

Ecological Engineering is the design of ecosystems for the mutual benefit of humans and the environment. Design that incorporates ecological engineering concepts considers humans to be part of nature rather than apart from nature. Ecological engineering requires a multi-disciplinary approach that may entail expertise in microbiology, physio-chemical treatment processes, thermodynamics, computational modeling, process design, and system engineering as well as ecology and environmental engineering.

Requirements

Area prerequisite or co-requisite courses beyond the departmental baseline requirements include at least one semester of study in thermodynamics, fluid mechanics, or statics; probability and statistics; ecology; and hydrology.

Area mastery courses include at least one course (3+ credit hours) in each of these areas of competence: 1) Ecosystem Restoration; 2) Pollutant Treatment; 3) Modeling; and 4) Ecosystem Sciences.

Geospatial Engineering

Geospatial Engineering is designed for specialized study in spatial information acquisition, analysis, modeling and applications.

This includes theoretical and applied projects in sensing systems and the location, measurement, analysis and description of ground features and earth resources. It also includes use of geographic information systems (GIS) to incorporate spatial data into a wide range of environmental and engineering problems.

Requirements

Area prerequisite or co-requisite courses beyond the departmental baseline requirements include at least one year of physics and one engineering science course in surveying, numerical methods, or computer science.

One area mastery course must be completed in four competencies : 1) remote sensing; 2) geographic information systems; 3) spatial analysis and programming; 4) statistics.

Students in the MPS program will take additional coursework in at least one of these competencies. MS students will take additional coursework in at least two competencies. . Ph.D. students will take additional coursework in at least three competencies.

In addition to competencies listed above, there is flexibility for students interested in supplementary areas. For example, students in the past have expanded their knowledge in geography, ecology, forestry, systems analysis, electrical/computer engineering and mathematics. Courses from these competencies are identified in consultation with the Major Professor and Steering Committee.

Water Resources Engineering

Water Resources Engineering addresses the analysis, prediction and design of water resource systems.

Emphasis is placed on applying engineering techniques to reduce impacts on human and natural systems. Students pursue solutions to water resources problems, in recognition of environmental, economic, legal, social and managerial constraints. The department has

computing facilities, field sites, and a fluids laboratory with a tilting sediment recirculating flume and river geomorphology table to support research activities. The program takes advantage of departmental expertise in GIS and remote sensing to address problems at a variety of scales.

Analytic techniques typically blend a combination of statistics, numerical analyses, and computer science.

Requirements

Area prerequisite or co-requisite courses beyond the departmental baseline requirements include at least one semester of study in fluid mechanics, computing methods, and engineering hydrology.

Area mastery courses include at least one course (3+ credit hours) in three competencies : 1) physical hydrology; 2) computational modeling; and 3) water quality.