GRADUATE PROGRAM IN ENVIRONMENTAL RESOURCES ENGINEERING

ERE participates in graduate education leading to the master of engineering, the master of professional studies, master of science, and doctor of philosophy degrees in environmental resources engineering. Graduate studies and research are primarily concerned with environmental and resource-related problems. 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 necessary background are required to take additional prerequisite courses required by the department.

Degrees

The Master of Engineering (M.E.) degree requires the successful completion of a minimum of 33 credits at the graduate level, of which 27 are in coursework. A 6 credit capstone design experience completes the M.E. degree requirements.

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.

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.

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.

All graduate degrees in ERE require completion of at least 15 credit hours of graduate coursework in engineering and applied science courses. A seminar is also required. Program mastery courses may be satisfied by prior study. Plans of study are individualized by academic advisors so that students acquire needed depth and breadth in their training and courses and reach their professional goals.

Graduate Options

There are five graduate options for the M.P.S., M.S., and Ph.D. degrees:

Ecological Engineering (M.P.S., M.S., Ph.D.)

Ecological Engineering is the design of ecosystems for the mutual benefit of humans and the environment. Ideal design considers humans to be part of nature rather than apart from nature.

At ESF we believe that ecological engineering education and research should meet local to global needs. We teach and research sustainable solutions and approach ecological engineering broadly, working in many areas of the world and in most major areas of ecological engineering.

Program Requirements

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

Program 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.

Environmental Management (M.P.S.)

Environmental Management combines environmental engineering science with environmental policy, social sciences, and management tools to provide breadth and perspective for the student aspiring to managerial responsibility.

Student coursework is designed to enhance technical and problem-solving skills to meet contemporary needs of environmental managers.

Program Requirements

Program prerequisite or co-requisite courses beyond the departmental requirement include at least one semester of study in at least three of the following fields: chemistry; computer science; environmental science; economics; and geographic measurements.

Program mastery courses include at least one course (3+ credit hours) in each of these areas of competence: 1) Project Management; 2) Environmental Policy; 3) Environmental Resources Engineering.

Environmental Resources Engineering (M.P.S., M.S., Ph.D.)

Environmental Resources Engineering takes an interdisciplinary approach to solve environmental resource-related problems in urban and natural settings.

Emphasis is placed on applying science and engineering principles to the analysis and design of engineered systems, processes and products that improve the conservation, restoration, development, and utilization of the built and natural environments. Students use modern engineering tools and techniques such as micrometeorology, remote sensing, hydrodynamic and atmospheric modeling, and systems analysis.

Program Requirements

Program prerequisite or co-requisite courses beyond the departmental requirements include at least one semester of study in thermodynamics, fluid mechanics, or statics; hydrology, chemistry, or biology; and computing methods.

Program mastery courses are arranged to meet the objectives of the individual student program. A student's program of study in this option may combine competence areas in the other ERE options, or introduce new competence areas.

Geospatial Information Science and Engineering (M.P.S., M.S., Ph.D.)

Geospatial Information Science and 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.

Program Requirements

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

Program mastery courses include at least one course (3+ credit hours) in each of these areas of competence: 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 areas, MS students will take additional coursework in at least two areas, and Ph.D. students will take additional coursework in at least three of these areas.

In addition to competence areas 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 competence areas are identified in consultation with the Major Professor and Steering Committee.

Water Resources Engineering (M.P.S., M.S., Ph.D.)

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.

Program Requirements

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

Program mastery courses include at least one course (3+ credit hours) in each of these areas of competence: 1) physical hydrology; 2) computational modeling; and 3) water quality.