Civil and Environmental Engineering, MS

Graduate study in civil and environmental engineering prepares students for professional careers and further study. The principal concentration areas are environmental engineering and environmental science; hydraulics, hydrology, and water resources; structures, mechanics, and materials; sustainable water development; and transportation.

Research and Study Areas

Structures, Mechanics, and Materials

The structures, mechanics, and materials curriculum is designed for students who wish to gain knowledge and skill in the mechanics of solids and structures that they can apply to civil infrastructure systems and other fields. The program concentrates on developing appropriate methodologies for tackling broad, complex issues related to civil infrastructure systems, and on educating engineers in the implementation and application of methodologies to actual engineering projects. Faculty members have expertise in structural engineering, design optimization, solid mechanics, and computational methods.

Transportation Engineering

The transportation engineering curriculum is geared toward students interested in developing specialized knowledge and skills applicable to the diverse set of issues associated with transportation. Faculty members have expertise in traffic engineering, infrastructure management systems, pavement engineering, advanced construction materials, dynamic load and pavement simulation, optimal design, winter highway maintenance, real-time simulation, human factors, intelligent sensors, nondestructive testing, transportation planning, and travel demand modeling.

Water and the Environment

The water and the environment graduate program focuses on both fundamental and applied aspects of environmental systems and processes across a range of scales. The water and the environment program offers unique opportunities for students to actively participate in the research, analysis, and design aspects of real-world problems. There are three areas of specialization: environmental engineering and science; hydraulics, hydrology, and water resources; and sustainable water development.

The environmental engineering and science curriculum provides a comprehensive base of coursework and research in the areas of air and water quality management; environmental chemistry and microbiology; natural systems modeling; and processes for water supply, pollution control, and solid and hazardous waste management.

The hydraulics, hydrology, and water resources curriculum is associated with IIHR—Hydroscience and Engineering, a world-renowned research institute, where senior staff members of the institute are professors in the program. IIHR offers unique curriculum opportunities in laboratory and field-scale experimentation and in mathematical modeling with IIHR's high-speed computer facilities.

The sustainable water development curriculum is focused on training interdisciplinary professional engineers, researchers, educators, and those who are ready to meet the water resource challenges of communities most in need. Community service and professional development experiences complement innovative research at the food, energy, and water nexus.

Across all specialization areas within water and the environment, interdisciplinary research and study are conducted with programs including the Center for Global and Regional Environmental Research, the Center for Health Effects of Environmental Contamination, the Center for Hydrologic Development, the Iowa Flood Center, the Iowa Superfund Research Program, the Hazardous Substances Research Center, and the Center for Biocatalysis and Bioprocessing; the departments of Chemical and Biochemical Engineering (College of Engineering), Microbiology and Immunology (Carver College of Medicine), and Occupational and Environmental Health (College of Public Health); the School of Earth, Environment, and Sustainability (College of Liberal Arts and Sciences); and the School of Planning and Public Affairs (Graduate College). Other areas of interdisciplinary focus include groundwater contamination, biotechnology, global climate change, and hazardous substances.

Learning Outcomes

Students will gain the ability to:

- apply principles of engineering and science for problem solving to meet societal needs;
- communicate effectively with a range of audiences;
- make ethical and professional judgments that consider the global, economic, environmental, and societal contexts of their decisions and proposed engineering solutions; and
- conduct research through the use of modern research tools and methodologies (thesis students only).

Requirements

The Master of Science program in civil and environmental engineering requires a minimum of 30 s.h. of graduate credit for thesis students; 31 s.h. for nonthesis students. The program enables students to concentrate in one or more areas of their choice. Students must maintain a UI cumulative grade-point average of at least 2.75.

The thesis option requires a minimum of 25 s.h. (eight courses) with the remaining 5 s.h. obtained in CEE:5999 Research: Civil and Environmental Engineering MS Thesis.

With the approval of their advisor, students develop a study plan that satisfies the requirements of their chosen curriculum. Students must pass an oral examination and, in some program options, a written examination.

Core Courses

All students must successfully complete the civil and environmental graduate core courses for their area of focus. Students are expected to complete these courses during their first year of study.

Elective Courses

Students choose elective courses from any academic area that strengthens their knowledge in their area of focus and provides needed research topic training. Individual

Investigations: Civil and Environmental Engineering (CEE:5998) is not considered a suitable elective.

Seminars

All full-time students are required to register for and participate in seminars in their respective program of study. This includes CEE:5096 Water, Energy, and Food Nexus Seminar for areas that fall under the water and environment curriculum (environmental engineering, environmental science, hydraulics, sustainable water development, and water resources) or CEE:5098 Graduate Seminar in Structures, Materials, Mechanics, and Transportation for students in transportation engineering or structures, mechanics, and materials.

Ethics Course

Students must enroll in ENGR:7270 Engineering Ethics.

Thesis

Students may earn up to 5 s.h. of research credit in CEE:5999 Research: Civil and Environmental Engineering MS Thesis. A total of 3 s.h. may be taken on an A–F graded basis at the discretion of the advisor.

Combined Programs

MS (Sustainable Water Development Subprogram)/MS in Urban and Regional Planning

The Department of Civil and Environmental Engineering and the School of Planning and Public Affairs collaborate to offer a combined Master of Science in civil and environmental engineering with a sustainable water development subprogram/Master of Science in urban and regional planning.

Separate application to each degree program is required. Applicants must be admitted to both programs before they may be admitted to the combined degree program. For more information, see the MS in urban and regional planning (Graduate College) in the catalog.

Admission

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website.

Each of the program's curricula is flexible; students may be admitted from all disciplines of engineering as well as from the mathematical and basic sciences.

Applicants should have a cumulative undergraduate grade-point average (GPA) of at least 3.00. Those with GPAs slightly lower should contact the department.

Graduate Record Examination (GRE) General Test scores are not required.

Career Advancement

The current and projected demand for MS graduates is excellent. Graduates are placed in advanced technical positions in industry, consulting firms, or government, or they may continue their graduate study. On average, 93–98% of graduates are employed in their field of study or pursuing advanced education within seven months of graduation.

Engineering Career Services develops and promotes experiential education and professional opportunities for students in the College of Engineering. Professional staff coordinate the college's co-op and internship program, engage in employer outreach, and provide opportunities for students to network with employers, including engineering career fairs and other programming related to career development.

Engineering Career Services offers individual advising and class presentations on résumé and cover letter preparation, job and internship search strategies, interviewing skills, job offer evaluation, and much more. Engineering Career Services partners with the Pomerantz Career Center to facilitate on-campus interviewing, postgraduation outcome collection, and the university's online recruiting system, Handshake.

Academic Plans

Sample Plans of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

Civil and Environmental Engineering, MS

Environmental Engineering Subprogram

This sample plan is currently being reviewed and will be added at a later date.

Environmental Science Subprogram

This sample plan is currently being reviewed and will be added at a later date.

Hydraulics Subprogram

This sample plan is currently being reviewed and will be added at a later date.

Structures, Mechanics and Materials Subprogram

This sample plan is currently being reviewed and will be added at a later date.

Sustainable Water Development Subprogram

This sample plan is currently being reviewed and will be added at a later date.

Transportation Subprogram

This sample plan is currently being reviewed and will be added at a later date.

Water Resources Subprogram

This sample plan is currently being reviewed and will be added at a later date.