Civil and Environmental Engineering, Ph.D.

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 aims 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 & 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 Iowa Superfund Research Program, the Hazardous Substances Research Center, and the Center for Biocatalysis and Bioprocessing; the Department of Chemical and Biochemical Engineering (College of Engineering); the Departments of Earth and Environmental Sciences, and Geographical and Sustainability Sciences (College of Liberal Arts and Sciences); the Department of Microbiology and Immunology (Carver College of Medicine); the Department of Occupational and Environmental Health (College of Public Health); and the School of Urban and Regional Planning (Graduate College). Other areas of interdisciplinary focus include groundwater contamination, biotechnology, global climate change, and hazardous substances.

Requirements

The Doctor of Philosophy program in civil and environmental engineering requires a minimum of 72 s.h. of graduate credit. Students must maintain a g.p.a. of at least 3.00 throughout the program. The doctoral degree is granted primarily on the basis of achievement rather than on a prescribed course of study.

Students usually need at least three years of full-time graduate study to complete the degree. All students must pass a qualifying examination. Students also must pass a written and oral comprehensive examination before they may be formally admitted to Ph.D. candidacy; the comprehensive examination usually is taken after all required coursework has been completed. Students devote one year to the preparation of a dissertation that contributes to knowledge in the field; they must defend their dissertation successfully in a final examination.

Consult the department’s Graduate Student Manual for more detailed information about the Ph.D. program in civil and environmental engineering.

Admission

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations of the Graduate College 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 graduate g.p.a. of at least 3.00. Those with grade-point averages slightly lower should contact the department.

Applicants should have a combined verbal and quantitative score of at least 301 on the Graduate Record Examination (GRE) General Test. Lower scores are considered with other evidence of academic promise (recommendation letters,
grade-point average). GRE General Test scores also are used in financial aid decisions.

Financial Support

A significant number of research assistantships are available on a variety of research projects, and a limited number of teaching assistantships may be available. Selection of recipients usually is based on scholastic achievement and research interest.

Career Advancement

Graduates are placed in advanced technical positions in industry, consulting firms, or government.

Engineering Professional Development (EPD) develops and promotes experiential education and professional opportunities for students. 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 an engineering career fair and other career-development programming each semester.

EPD also offers individual advising and class presentations on résumé and cover letter preparation, job and internship search strategies, interviewing skills, and job offer evaluation.