Civil and Environmental Engineering, M.S.

Civil and Environmental Engineering provides innovative solutions at the interface of the natural and the built environment for the benefit of society. As such, education and research address the efficient design, maintenance, and sustainability of infrastructure while taking into account natural, social, and economic constraints. The Department of Civil and Environmental Engineering focuses its graduate study and research program on four areas: **Structures, Geotechnics, and Materials**, which includes civil infrastructure materials, engineering mechanics, advanced composites, structural dynamics, performance-based earthquake engineering, geotechnical engineering, and reliability and risk assessment; **Transportation Systems**, which includes traffic operations and management, advanced information technology applications, travel behavior, transportation and the environment, smart cities, and transportation systems analysis; **Hydrology and Water Resources Systems**, which includes dynamics of the hydrologic cycle and climate induced variability, flood and drought prediction and mitigation, and remote sensing of hydrologic systems; and **Environmental and Energy Systems**, including environmental pollution mitigation, water and air quality, water treatment technologies, water and energy nexus, and renewable energy.

M.S. applicants must submit at least one letter of recommendation. Students who apply to the M.S.-only program must petition for the Ph.D. program if they desire to continue on for the Ph.D. Additional program information is available on the Department of Civil and Environmental Engineering website (https://engineering.uci.edu/dept/cee/academics/graduate/).

The M.S. reflects achievement of an advanced level of competence for the professional practice of civil and environmental engineering. Two plans are available to those working toward the M.S.: Thesis option and Course Work option. Opportunities are available for part-time study toward the M.S. The Plan of Study for both options must be developed in consultation with a Faculty Advisor and approved by the Program Graduate Advisor.

Plan I: Thesis Option

The thesis option requires completion of 48 units of study of which a maximum of ten units can be taken for study in conjunction with the thesis research topic. Upon approval of the Program Graduate Advisor, the maximum of 10 units of thesis research can be extended to 16 units. Thesis research includes the completion of an original research project; the writing of the thesis describing it; and review by a thesis committee. Of the 48 units, a minimum of 28 units must be in non-research, graduate-level approved engineering or related courses (numbered 200–292, and 298). The remaining units may be earned as graduate-level course work, individual research, or upper-division undergraduate units (maximum ten units).

Plan II: Course Work Option

Course Work option requires the completion of 48 units of study, at least 40 of which must be in non-research graduate-level approved engineering or related courses (numbered 200–292, and 298). The remaining eight units may be earned as graduate-level course work, individual research, or upper-division undergraduate units.

At the point of application a student is required to choose one of four focus areas: Structures, Geotechnics and Materials; Transportation Systems; Hydrology and Water Resources Systems; or Environmental and Energy Systems. Once admitted, each student will be assigned to an advisor from among active faculty in their focus area. Financial support through research or teaching assistantships and a variety of fellowships and scholarships is available to qualified students and highly competitive. Interdisciplinary study in one or more areas outside of the student's primary focus area is strongly encouraged.

Structures, Geotechnics, and Materials

This area emphasizes the application of analytical, numerical, experimental, and practical approaches to the investigation of built infrastructure systems that withstand natural and man-made loads and hazards. Specific interests include sensors and structural health monitoring, composites for infrastructure applications, reliability and risk assessment of civil engineering systems, structural control, system identification and damage detection, performance-based earthquake engineering, soil-structure interaction, smart materials and structures, multi-scale modeling, and sustainable green materials and infrastructural systems.

Transportation Systems

Among leading centers for transportation research, the department offers a graduate research area that is distinguished by its interdisciplinary approach to the study of current and emerging urban transportation issues and through its partnership with the UC Irvine Institute of Transportation Studies. This area focuses on the planning, design, operation, and management of complex transportation systems. Emphasis is on the development of fundamental knowledge in engineering, systems analysis, modeling, and planning, combined with advanced computational techniques and information technologies, to address transportation problems affecting urban travel and goods movement.

Hydrology and Water Resources Systems

Developing sustainable water supplies while preserving natural resources and the environment is a grand challenge in the 21st century requiring interdisciplinary thinking and engineering solutions. This area focuses on fundamentals and the use of mathematical, computational, and experimental approaches to understanding the dynamics of the hydrologic cycle, transport within aquatic systems, and the impact of human activity, particularly in urban areas. Specific areas include water resources planning, remote sensing of the environment, water-related hazards such as floods and droughts, and transport in land, oceans, and the atmosphere.

Environmental and Energy Systems

Treatment, distribution, and collection of water and wastewater are energy intensive operations, and energy generation and distribution have direct and indirect impacts on environmental systems. This area addresses these interrelated challenges by focusing on the treatment and supply of water for municipal, agricultural, energy, and environmental uses, sustainable practices for managing urban stormwater, and chemical and microbiological processes for water treatment. Additionally, novel approaches for energy generation and distribution are covered in this area. Understanding and minimizing emissions of greenhouse gasses associated with water and wastewater treatment and energy generation and distribution are common themes in this area.