

# CIVIL AND ENVIRONMENTAL ENGINEERING

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Department Website ([https://www.sc.edu/study/colleges\\_schools/engineering\\_and\\_computing/departments/civil\\_and\\_environmental\\_engineering/](https://www.sc.edu/study/colleges_schools/engineering_and_computing/departments/civil_and_environmental_engineering/))

Dr. Juan Caicedo, Chair

Civil and environmental engineers are involved with the systems that are essential to our modern way of life. For example, civil and environmental engineers plan, design, and construct roads, bridges and airports, buildings, water supply and wastewater treatment plants, waterways, ports, and dams. They also work to protect the environment by developing and applying remedial technologies to contaminated groundwater and soil. Civil and environmental engineers are well qualified to participate in public and private decision-making processes regarding infrastructure systems, and, as such, serve as technical and policy advisors or elected officials.

The Department of Civil and Environmental Engineering offers programs leading to the Master of Science, Master of Engineering, and Doctor of Philosophy degrees. Students in the M.S. and Ph.D. degree programs specialize in at least one of the following program areas: environmental engineering, geotechnical engineering, structural engineering, transportation engineering, water resources engineering and railway engineering. Students in the M.E. program may opt to specialize in one area of study or obtain a broad range of experience across the civil and environmental engineering discipline.

## Areas of Specialization

**Environmental Engineering** focuses on sustainability and environmental applications and implications of nanotechnology, including water and wastewater reclamation, bioreactor landfills, waste conversion processes, treatment technologies for developing countries, application of nanomaterials for developing innovative remediation technologies, quantum modeling of nanomaterials, and understanding fate, transport, and toxicity of nanomaterials in the environment.

**Geotechnical Engineering** focuses on soil, rock and engineered geomaterials with specific concentrations on field and laboratory investigations using standard and novel testing technologies, design and performance of foundations and earth structures, slope stability analyses, soil dynamics and liquefaction, pavement design and performance, landfill design and instrumentation, and geoenvironmental studies.

**Structural Engineering** focuses on structural design, and analysis for buildings, bridges and other civil structures, materials characterization and modeling including concrete, steel and fiber reinforced polymers, multi-scale structural testing, advanced numerical simulations, structural health monitoring and prognosis, life-cycle and environmental performance analysis, and seismic engineering and design.

**Transportation Engineering** focuses on modeling transportation system operations, traffic sensing technologies and traffic data analyses, including intelligent transportation systems, modeling and simulation of large-scale transportation networks, weigh-in-motion systems, traffic studies, traffic signal simulation and pavement management systems and performance modeling.

**Water Resources Engineering** focuses on the study and computer modeling of natural and industrial flow and transport processes, both in the laboratory and in the field, including fluid mechanics, hydraulic transients, cardiovascular flow, river mechanics and marine sediment transport, scour, hydrology of landfills, storm water modeling and best management practices, and watershed scale hydrology.

**Railway Engineering** focuses on the unique challenges of planning, design, monitoring, inspection, maintenance and management of railway infrastructure and operations of the freight and passenger railway network through development and implementation of novel technologies, intelligent systems, remote sensing, field and laboratory testing procedures, and advanced computer modeling and simulations.

## Accelerated B.S.E./Master's Plans

A combined B.S./M.S. or B.S./M.E. degree program is available to undergraduate civil and environmental engineering students with GPAs of 3.40 or above and 90 or more hours earned toward their B.S. degree. Up to six (6) credit hours at or above the 500-level may be applied toward a student's B.S./M.E. program of study. Up to a total of six (6) credit hours of ECIV 797 and graduate course work at or above the 500-level toward a B.S. degree may be applied toward a student's B.S./M.S. program of study. The approval of the student's advisor and the Department's graduate director are required. Questions about this program may be directed to the Department's graduate director.