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# GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING

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## DEPARTMENT OF CIVIL AND MATERIALS ENGINEERING



**UIC**

UNIVERSITY OF  
ILLINOIS AT CHICAGO

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## PROGRAM DESCRIPTION

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The Department of Civil and Materials Engineering offers programs of study leading to the **Master of Science** and **Doctor of Philosophy in Civil Engineering** degrees.

The Geotechnical and Geoenvironmental Engineering program emphasizes the fundamental concepts of soil properties and behavior as well as the development and/or application of modern methods of analysis and design for a wide range of civil and environmental engineering projects. The Program coverage is broad and it includes geotechnical aspects such as structural foundations, retaining structures, earth dams and levees, tunnels, site improvement, and offshore platforms and pipeline foundations. In addition, the Program includes geoenvironmental aspects such as landfills, impoundments, waste recycling and reuse, groundwater flow and contaminant transport, and contaminated site assessment and remediation. The Program provides flexibility and diversity that enables a comprehensive course curriculum and a wide range of research opportunities.

The Geotechnical and Geoenvironmental Engineering Laboratory houses standard soil testing equipment as well as specialized equipment to conduct cutting-edge research. Financial assistantships are available to qualified full-time students. Excellent job opportunities exist for our graduating students in both industry and academia.

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## DEGREE REQUIREMENTS

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The specific M.S. and Ph.D degree requirements are the same for all civil engineering students. Refer to the Departmental and Graduate College Degree requirements for details. Generally, M.S. students require completion of 36 semester hours

of coursework (9-10 courses). Some students elect the thesis option that requires a minimum 28 hours of course work (7-8 courses) and 8 hours of thesis. Beyond the M.S degree, Ph.D students require a minimum of 36 semester hours of course work and 36 semester hours of dissertation research. The specific research topic for M.S thesis or Ph.D dissertation is selected under the guidance of a faculty advisor. Commonly, the graduate students select their courses under the guidance of a faculty advisor:

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## COURSES

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### *Geotechnical Courses:*

CME405-Foundation Analysis and Design  
CME407-Soil and Site Improvement Methods  
CME505-Advanced Soil Mechanics  
CME515-Embankments and Earth-Retaining Structures

### *Geoenvironmental Courses:*

CME415-Geoenvironmental Engineering  
CME425-Hazardous Waste and Site Remediation Engineering  
CME516-Waste Management & Landfill Engineering  
CME549-Flow and Contaminant Transport Modeling

### *Environmental Courses:*

CME411-Chemistry for Environmental Professionals  
CME 420-Environmental Analysis Laboratory  
CME 422-Wastewater Treatment Design  
CME 525-Bioremediation Design  
CME 419-Air Quality Management I

### *Earth Sciences Courses:*

EaES415-Environmental Geochemistry  
EaES475-Hydrogeology

### *Other Courses:*

CME434-Finite Element Analysis  
GEOG481-Geographical Information Systems  
*Other courses are selected as approved by the advisor.*

## RESEARCH

The University of Illinois-Chicago is a Research I University with over \$250 million in annual research expenditures. Currently, geoenvironmental research is focused on in-situ remediation of contaminated soils and groundwater, waste containment systems (in-situ barriers, landfills and surface impoundments), beneficial reuse of waste and recycled materials in civil and environmental engineering, and durability of engineered geoenvironmental systems. Extensive research is being conducted on electrokinetic remediation of soils and groundwater contaminated by heavy metals and/or organic pollutants. Research is also being conducted to develop a rational approach for the design of in-situ air sparging systems for the remediation of saturated soils and groundwater contaminated by volatile organic compounds. In-situ containment of solid and hazardous wastes and sediments is also being investigated. Large-scale applications of waste materials such as scrap tires, discarded plastics, and municipal sludge, are studied. Research approaches include theoretical modeling, laboratory feasibility studies and field pilot-scale investigations in order to address both fundamental and practical issues. Research programs of the faculty are outlined in their respective webpages.

## FINANCIAL ASSISTANCE

Financial support is available for qualified students in the form of teaching assistantships, research assistantships, and fellowships.

*Students working in teams on various projects*



## FACULTY

**Christophe Darnault, Ph.D.** Assistant professor: Hydrology and Water Resources Engineering, Watershed Management, Agriculture and Biotechnology

**Amid Khodadoust, Ph.D.** Assistant professor: Water treatment, physical/chemical processes for hazardous waste treatment and remediation

**Krishna Reddy, Ph.D., P.E.** Associate Professor: Geotechnical and geoenvironmental engineering

**Karl Rockne, Ph.D., P.E.** Assistant professor: Applied microbiology, wastewater treatment, pollutant fate in air, sediment, and water

**Thomas Theis, Ph.D., P.E.** Professor and Director, Institute for Environmental Science and Policy: Aquatic chemistry, environmental systems analysis, life cycle analysis

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