Geosystems Engineering

GEOSYSTEMS Engineering provides broad and in-depth educational and research opportunities in geo-related engineering fields. Geosystems engineering includes geotechnics, geomechanics, geomaterials, geophysics, geochemistry, geology, and bio-geoengineering. This program allows students to comprehend the behavior of natural and man-made materials to analyze, design and construct engineered systems. Research is supported by federal and state agencies including the National Science Foundation, the U.S. Geological Survey, the Federal Highway Administration, the U.S. Department of Energy, the Nuclear Regulatory Commission, the National Aeronautics and Space Administration, the Georgia Department of Transportation, as well as private consulting, manufacturing and testing companies, with interests in the mining, petroleum, energy and infrastructure sectors. Graduate students may select from almost 25 geotechnical graduate courses, engage in basic and applied research, and participate in a wide range of professional development and social activities coordinated by the Georgia Tech Geotechnical Society.

RESEARCH AREAS

- Bio-mediated and bio-inspired geotechnics
- Energy geotechnology
- Geotechnical analysis and design
- Natural hazards engineering
- Engineered geomaterials
- Sustainable subsurface engineering
- Rock mechanics and engineering
- Micro-geomechanics and granular mechanics
- Subsurface characterization

FACILITIES

The Geosystems Engineering instruction and research laboratories occupy more than 900 square meters of custom space within the Mason Building, including:

- Soil Mechanics Instruction Laboratory
- Damage Poromechanics Laboratory
- Geoenvironmental Engineering Laboratory
- Sustainable Geotechnical Systems Laboratory
- In-Situ Research Laboratory
- Rock and Fracture Mechanics Laboratory
- Subsurface Processes Laboratory
- NSF Engineering Research Center for Bio-mediated and Bio-inspired Geotechnics (CBBG)

GEOTECHNICAL SOCIETY

The Georgia Tech Geotechnical Society serves both graduate and undergraduate students who share a common interest in geosystems engineering. The Society coordinates student participation in conferences, professional meetings, intramural athletics and social events. The Society administers the Geotechnical Society Fund, a pool of resources provided by alumni, corporate donors and friends. The Society also assists the ASCE Geo-Institute Georgia Chapter with hosting the Annual Geosystems Poster Symposium each fall, as well as the George F. Sowers Annual Symposium each spring in memory of Professor Sowers’ many academic and professional achievements.

MASTER'S DEGREE REQS*

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TOTAL REQUIRED CREDITS

| 30 CREDITS | 30 CREDITS |

*Degree Requirements for the MSCE and MSENVE degrees. Requirements for the MSBIOE, MSCSE, and MSESOM degrees differ – please contact gradinfo@ce.gatech.edu for more information. **Specializations include: Construction and Infrastructure Systems Engineering; Environmental Engineering; Geosystems Engineering; Structural Engineering, Mechanics and Materials; Transportation Systems Engineering; Water Resources Engineering.

PH.D. DEGREE REQS

The Ph.D. program includes research and approximately 50 credits beyond the Bachelor’s degree. Doctoral students, in concert with their advisor and thesis committee, construct an individualized program of study tailored to the student’s research interests. Major elements of the program include:

- Comprehensive exam
- Minor
- Research proposal
- Thesis
- Oral defense

NON-THESIS OPTION

| 18 CREDITS | 12 CREDITS | 0 CREDITS | 30 CREDITS |

THESIS OPTION

| 12 CREDITS | 12 CREDITS | 6 CREDITS | 30 CREDITS |

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CHLOÉ F. ARSON, PH.D. Associate Professor
Damage and healing mechanics for rocks and concrete, coupled processes in porous media, simulation of fracture propagation in anisotropic materials, bio-inspired burrowing mechanisms, bio-inspired infrastructure network design.

RUDOLPH BONAPARTE, PH.D., P.E., F.ASCE, N.A.E. Professor of the Practice & Chairman and Senior Principal, Geosyntec Consultants: Geoenvironmental engineering; shear strength and slope stability; dams and levees; waste disposal facility design; natural hazard mitigation; engineering leadership

SUSAN E. BURNS, PH.D., P.E., F.ASCE Associate Chair for Administration and Finance & Professor
Geoenvironmental engineering; engineered materials; physical and chemical behavior of soils; physical remediation of contaminated soil and groundwater; and beneficial use of waste materials.

G. WAYNE CLOUGH, PH.D., P.E., DIST.M.ASCE., N.A.E. President Emeritus, Georgia Institute of Technology & Secretary Emeritus, Smithsonian Institution
Tunneling, excavation, large construction; finite elements; strength anisotropy; earthquake engineering; climate change; nature and man-made hazards; engineering leadership

SHENG DAI, PH.D., P.E. Associate Professor & Group Coordinator
Energy geotechnics; geomaterials characterization; multiphase flow in porous media; subsurface geomechanics

J. DAVID FROST, PH.D., P.E., P.ENG, F.ASCE
Elizabeth and Bill Higginbotham Professor
Geomaternal characterization; 2-D and 3-D micro-structure quantification; interface mechanisms; spatial earthquake hazard analysis; image processing and analysis; bio-geotechnics performance of earth retaining structures.

HAIYING HUANG, PH.D. Associate Professor
Rock mechanics; fracture mechanics; coupled processes; flow in porous media; fluid injection into granular media; hydraulic fracturing; rock cutting and indentation.

JORGE MACEDO, PH.D. Assistant Professor
Geotechnical earthquake engineering; performance-based engineering; risk and reliability; numerical modeling; and mining geotechnics.

PAUL W. MAYNE, PH.D., P.E. Professor Emeritus
In situ testing; site characterization; foundation systems; soil properties determination; geostatic stress state; ground improvement; and cone penetrometers.

ROBERT C. BACHUS, PH.D., P.E.
GLENN J. RIX, PH.D., P.E.

I AM CEEatGT: KARIE Y. YAMAMOTO Doctoral Student in Geosystems Engineering: “I chose geotechnical engineering because I am interested in the practices and problems related to building infrastructure on, in and with geomaterials, particularly in regard to megacities and sustainability. Courses here not only cover fundamentals in the areas of geotechnical engineering, but also provide discussion on novel areas, such as bio-inspired geotechnics. The faculty are always willing to help and provide exceptional insight, offering ample research opportunities and innovative approaches to explore geotechnical engineering problems. Through the Geosociety, the graduate students have created a supportive and welcoming environment. I have benefited both academically and personally from this amazing community.”