Ira A. Fulton Schools of Engineering
ARIZONA STATE UNIVERSITY

school of sustainable engineering and the built environment

civil, environmental and sustainable

geotechnical / geoenvironmental engineering

Geotechnical and Geoenvironmental Engineers are concerned with anything built on, in, or of the earth. These concerns involve both the mechanical properties of geo materials and transport processes for fluids and gases through geo materials. Geotechnical and Geoenvironmental Engineering includes the analysis and design of foundation systems, slope stability analysis, design and construction of earthworks (including pavement subgrades, embankments, dams and levees, and earthfills), evaluation and control of seepage and flow through porous media, analysis and design of waste containment systems, and geotechnical aspects of earthquake engineering.

Geotechnical and Geoenvironmental Engineering at ASU is focused upon unsaturated soil mechanics, waste mechanics, and geotechnical earthquake engineering. ASU is a leader in unsaturated soil mechanics applied to the performance of pavement subgrades and the impact of expansive soil upon foundations. ASU's unsaturated soil mechanics laboratory is one of the finest in the world and has been responsible for many innovations in unsaturated soil testing. ASU's Enamul and Mahmuda Hoque laboratory has unique, large scale equipment for static and dynamic testing of waste materials. Research on the seismic design of geosynthetic lined landfills being conducted at ASU combines our strengths in waste properties and seismic analysis and design. Geotechnical research at ASU also includes groundbreaking work on microbially-induced carbonate precipitation for remediation of earthquake hazards in conjunction with the ASU Biodesign Institute's Center for Environmental Biotechnology. The work of the Geotechnical and Geoenvironmental Engineering group at ASU on mitigation of geologic hazards (expansive soils, earthquake engineering) and environmental protection and remediation (landfill engineering) has many synergies with the School of Sustainable Engineering for the Built Environment and ASU's emphasis on resilient and sustainable infrastructure.

GEOTECHNICAL FACULTY

- Sandra Houston, Professor
- Chris Lawrence, Lecturer
- Edward Kavazanjian, Professor (Specialty Area Coordinator)
- Claudia Zapata, Assistant Professor

LIST OF COURSES

The graduate geotechnical courses taught in CESE and some of the recommended courses outside the geotechnical area that may be included in a Master's or post-Master's Plan of Study (POS) are listed below. Other graduate level courses may be included in a POS with the approval of the student's Graduate Supervisory Committee (GSC).

Graduate Geotechnical Courses

- CEE 550 Soil Behavior
- CEE 551 Advanced Geotechnical Testing
- CEE 553 Advanced Soil Mechanics
- CEE 554 Shear Strength and Slope Stability
- CEE 555 Advanced Foundations
- CEE 557 Geoenvironmental Engineering
- CEE 559 Earthquake Engineering
- CEE 598 Foundations*

*CEE 452 may be taken as CEE 598 for graduate credit if you have not taken an undergraduate Foundation Engineering course

Additional CEE Graduate Courses

- CEE 515 Design and Behavior of Portland Cement Concrete Mixtures
- CEE 521 Stress Analysis
- CEE 526 Finite Elements for Engineers
- CEE 532 Developing Software for Engineering Applications
- CEE 536 Structural Dynamics
- CEE 537 Advanced Finite Element Analysis
- CEE 540 Groundwater Hydrology
- CEE 541 Surface Water Hydrology
- CEE 564 Contaminant Fate and Transport
- CEE 598 Structural Design
- CEE 598 Earth Systems Engineering
- CEE 598 Environmental Microbiology

Additional FSE Graduate Courses

- MAE 591 Constitutive Relations and Material Behavior
- IEE 572 Design of Engineering Experiments
- MSE 513 Polymers and Composites

MSE 516 Mechanical Properties of Solids

It is important for all doctoral students to read the Civil, Environmental and Sustainable Engineering Ph.D. program manual.

M.S. PROGRAM

The advisor, in consultation with the student, will establish a Graduate Supervisory Committee (GSC). The GSC shall be composed of a minimum of three members from the CESE tenure-track faculty with at least two being from the Geotechnical Group. The advisor shall serve as the chair of the GSC.

The Plan of Study (POS) must be in accordance with Graduate College and Civil, Environmental and Sustainable Engineering (CESE) Program requirements. The candidate must complete at least 30 semester hours of approved course and research work distributed as follows:

1) at least fifteen (15) hours of Graduate Geotechnical courses
2) not more than three (3) hours of CEE590
3) 6 hours of thesis (CEE599)

M.S.E. PROGRAM

The Graduate Supervisory Committee (GSC) shall consist of all tenure -track CESE faculty, including at least 2 from the Geotechnical Group. The advisor shall serve as the chair of the GSC.

The Plan of Study (POS) must be in accordance with Graduate College and Civil, Environmental and Sustainable Engineering (CESE) Program requirements. The candidate must complete at least 30 semester hours of approved course work, including at least eighteen (18) hours of Graduate Geotechnical courses.

A final written Comprehensive Exam will be administered by the Geotechnical Group twice per year, usually the last Friday of classes during the regular fall and spring semesters. The exam is intended to demonstrate proficiency in 6 of the 9 core class subjects. The core subject areas are Soil Behavior, Advanced Geotechnical Testing, Advanced Soil Mechanics, Shear Strength and Slope Stability, Advanced Foundations and Earth Structures, Seepage, Geotechnical Earthquake Engineering, Foundations and Unsaturated Soil Mechanics.

- Students will be given 8 hours to complete the exam and are expected to spend roughly one hour per core subject area. Students will be able to select at the time of the test which 6 core class subject areas will be graded. Students will be graded in a minimum of 6 core subject areas. The exam is open book. The exam will be graded by the Geotechnical faculty and a pass/fail decision made as a collective group. A student who fails the comprehensive exam the first time may petition to retake the exam once more no sooner than 90 days after the first exam and no later than one year. A student must be registered for at least one credit every fall and spring until they are officially completed with their degree and pass the comprehensive exam.