



CEN 317 Soil Mechanics Laboratory

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

This course explores advanced topics in soil mechanics with a focus on experimental methodologies, drawing from the pioneering work of a number of leading researchers. Through a combination of theoretical lectures, laboratory demonstrations, and hands-on experiments, students will gain a deep understanding of the principles and techniques involved in experimental soil mechanics.

Upon Completion of this Course, students will be able to:

1. Use laboratory tests to identify and categorize soil qualities.
2. Investigate stress distributions and their impact on soil behavior.
3. Determine the elements influencing soil permeability and use measuring techniques.
4. Determine stress-strain correlations under a variety of loading circumstances.
5. Examine stress distribution patterns and the consequences for soil stability.

PREREQUISITES

ENR 121 Mechanics of Materials, CEN 211 Geotechnical Materials and Processes, CEN 215 Fluid Mechanics

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM

POINTS



Quizzes	15 Points
Lab Reports	45 Points
Project	10 Points
Final Exam	30 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

T. Schanz, *Experimental Unsaturated Soil Mechanics*, Springer, 2007.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	Topics: Topic 1: Influence of Relative Density and Clay Fraction on Soils Collapse Topic 2: Fabric Changes in Compacted London Clay Due to Variations in Applied Stress and Suction Topic 3: A Comparative Study of Soil Suction Measurement Using Two Different High-Range Psychrometers Topic 4: Determination of the Soil Water Retention Curve with Tensiometers Assessments: Quiz#1 Lab Report#1
Module 2	Topics: Topic 5: Tensiometer Development for High Suction Analysis in Laboratory Lysimeters Topic 6: Shear Strength Affected by Suction Tension in Unsaturated Fine Grained Soils? Topic 7: Shear Strength Behaviour of Unsaturated Silty Soil Topic 8: Testing Unsaturated Soil for Plane Strain Conditions: A New Double



	<p>Wall Biaxial Device</p> <p>Assessments:</p> <p>Quiz#2</p> <p>Lab Report#2</p>
Module 3	<p>Topics:</p> <p>Topic 9: Influence of State Variables on the Shear Behaviour of an Unsaturated Clay</p> <p>Topic 10: Effect of Capillary and Cemented Bonds on the Strength of Unsaturated Sands</p> <p>Topic 11: Determining the Shear Strength of Unsaturated Silt</p> <p>Topic 12: Factors Affecting Tensile Strength Measurement and Modified Tensile Strength Measuring Apparatus for Soil</p> <p>Assessments:</p> <p>Project</p> <p>Lab Report#3</p>
Module 4	<p>Topics:</p> <p>Topic 13: Some Aspects of the Effect of the Temperature on the Behaviour of Unsaturated Sandy Clay</p> <p>Topic 14: Influence of Temperature on the Water Retention Curve of Soils. Modelling and Experiments</p> <p>Topic 15: Thermo-Hydro-Mechanical Behaviour of Compacted Bentonite</p> <p>Topic 16: Results from Suction Controlled Laboratory Tests on Unsaturated Bentonite – Verification of a Model</p> <p>Assessments:</p> <p>Quiz#3</p> <p>Project due</p>
Module 5	<p>Topics:</p> <p>Topic 17: Water Balance and Effectiveness of Mineral Landfill Covers – Results of Large Lysimeter Test-Fields</p> <p>Topic 18: A Retention Curve Prediction for Unsaturated Clay Soils</p> <p>Topic 19: Earthquake-Induced Mudflow Mechanism from a Viewpoint of Unsaturated Soil Dynamics</p> <p>Topic 20: Bearing Capacity of Model Footings in Unsaturated Soils</p> <p>Assessments:</p> <p>Final Exam</p>

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.



Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university



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administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.