



蘇州大學
Soochow University

CEN 411 Rock Mechanics

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

Rock Mechanics is a comprehensive course that delves into the fundamental principles and applications of mechanics as they relate to rocks and rock masses. Through a combination of theoretical concepts, laboratory experiments, and practical case studies, students will gain a deep understanding of the behavior of rocks under various geological conditions. Topics covered include rock properties, stress and strain analysis, failure mechanisms, stability analysis of rock slopes and excavations, and design of support systems for underground structures. Emphasis will be placed on developing analytical skills, problem-solving abilities, and the application of rock mechanics principles to real-world engineering challenges.

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

1. To identify different types of rock formations and geological structures, and learn how to interpret geological maps, cross-sections, and borehole data.
2. To understand the fundamental properties of rocks and rock masses and learn how to classify rock masses based on geological and geomechanical parameters.
3. To analyze stress and strain distributions in rock formations.
4. To evaluate the stability of rock slopes and design appropriate stabilization measures.
5. To identify different failure mechanisms in rocks and predict their occurrence.
Learn about different types of foundations used in rock engineering.
6. To understand the principles and applications of in-situ testing techniques such as borehole logging and seismic methods.
7. To design support systems for underground excavations based on rock



mechanics principles.

8. To apply theoretical knowledge to practical engineering problems in the field of rock mechanics.

PREREQUISITES

CEN 307 Engineering Geology; CEN 310 Soil Mechanics

GRADING

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

ITEM	POINTS
Quizzes	20 Points
Midterm 1	15 Points
Midterm 2	15 Points
Project	20 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:

Richard E. Goodman. (1991), *Introduction to Rock Mechanics*, 2nd Edition, published by Wiley.

Recommended (Optional) Texts or Other Materials:

1. John Conrad Jaeger, Neville G. W. Cook, Robert Zimmerman. (2007), *Fundamentals of Rock Mechanics*, 4th Edition, Blackwell Publishing.
2. Evert Hoek, Jonathan D. Bray. (1974), *Rock Slope Engineering*, 3rd Edition, CRC Press.
3. Duncan C. Wyllie. (2017) *Rock Slope Stability: Civil Applications*, 5th Edition,



CRC Press.

COURSE TOPICS

MODULE	TASKS
Module 1	Topics: Topic 1: Introduction and index properties of rocks. Topic 2: Fields of applications of rock mechanics. Topic 3: The nature of rocks. Topic 4: Porosity and density of rocks. Assessments: Quiz#1
Module 2	Topics: Topic 5: Common laboratory strength tests. Topic 6: Strength and deformability of intact rocks. Topic 7: The meaning of “rock strength”. Topic 8: The effect of water. Assessments: Quiz#2 Project
Module 3	Topics: Topic 9: Representation of fractures using stereographic projection. Topic 10: Fractures and discontinuities. Topic 11: Techniques for measurement. Topic 12: Measuring properties of fractures and discontinuities. Assessments: Midterm#1 Project
Module 4	Topics: Topic 13: Properties of rock masses. Topic 14: Measuring properties of rock masses. Topic 15: Analysis of plane slide. Topic 16: Rock slope stability. Assessments: Midterm#2 Project due



Module 5	<p>Topics: Topic 17: Use of the geomechanics classification. Topic 18: Design of underground openings. Topic 19: Rock foundations. Topic 20: Methods of rock stabilization: bolts, anchors, grouting.</p> <p>Assessments: Final Exam</p>
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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.



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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 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.