

CE 361 - SOIL MECHANICS I (3+2 Credits) SYLLABUS Fall 2024-2025

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Lectures, Recitations, and Lab. hours: Laboratory studies will be in groups. The working times of the groups will be announced at the first laboratory hour.

	Monday	Tuesday	Wednesday	Thursday	Friday
08.45-09.30					
09.45-10.30					LECTURE B213
10.45-11.30					LECTURE B213
11.45-12.30					LECTURE B213
13.30-14.15					
14.30-15.15					
15.30-16.15					LABORATORY Geotechnical Lab.
16.30-17.15					LABORATORY Geotechnical Lab.

Textbook: Soil Mechanics & Foundations – John Wiley: Muni Budhu

Course Website: All announcements and course material will be uploaded on IYTE cloud-lms (<https://cloud-lms.iyte.edu.tr/>)

Outline: A study of granular and cohesive soils' physical and mechanical properties. The nature of water flow in soil, stress distribution, deformation analysis, consolidation, and strength of soils. Laboratory procedures for classifying soils and determining their properties and behavior.

Description: Soils are weak, compressible, porous earthen materials. Develop a good understanding of the mechanics of soil behavior under various natural and imposed loading conditions. Attention will be focused on the behavior of idealized soil elements from which the behavior of large soil masses may be inferred. Various phenomena of vital interest to geotechnical engineers arising from the interaction of soil grains and pore water (and air) through time and space will be discussed. The significant factors governing the strength and compressibility of soils, including the memory of geotechnical events, will be developed within a coherent theoretical framework. Such theoretical knowledge will prove invaluable in the field, where the diversity of observed phenomena often obscures the mechanics of soil behavior. To complement theoretical studies, students will have the opportunity to carry out standard laboratory tests on soils.

Lectures and reading assignments: Students MUST read the relevant chapters before class. Quizzes will be given during the class hours.

The topics to be covered are listed below:

1. Introduction Geotechnical Engineering – Practical Problems (Ch 1)
2. Soil composition, Soil identification & Classification: Soil formation and geological cycles, Clay minerals, Coarse and fine-grained soils – comparison, Phase relations, void ratio, porosity, unit weight (Ch 2)
3. Soil classification schemes: Particle size analysis, index properties, liquid limit/plastic limit (Ch 2)
4. Flow of water through soils: Darcy’s law, hydraulic conductivity (Ch 2)
5. Flow through soils and problems, introduction to flow nets (Ch 2 and Ch 9)
6. Soil compaction (Ch 2)

Midterm Exam I– Closed book (the date will be announced)

7. Stresses, strains, and elastic deformations in soils (Ch 3)
8. Stresses and strains, Hook’s law, Mohr’s circle for stress and strain, stress invariants (Ch 3)
9. Total and effective stress concept, pore water pressure (Ch 3)
10. Stress due to geostatic stress fields, vertical and horizontal stress, lateral earth pressure at rest (Ch 3)
11. Stresses in soils due to surface load: point load, line load, uniformly distributed load (Ch 3)

Midterm Exam II – Closed book (the date will be announced)

12. Consolidation settlement in fine-grained soils (Ch 4)
13. Shear strength of soils (Ch 5)

Final Exam – Closed book (the date will be announced)

Grading Policy: Hmw (4pts), Quizzes (6pts), Lab. works (10pts), Midterm Exam I (25 pts), Midterm Exam II (25pts), Final Exam (30pts) – **Total 100 points**

How to pass and do well in the course:

1. Come regularly to class & lab and pay attention. Ask questions.
2. Take good notes and understand what you wrote.
3. Before you attempt to solve your homework problems, read the appropriate chapter from the book as well as the class notes and try to understand (concept) solved problems.
4. Do **all** the homework by yourself.
5. Get help if you needed.
6. Prepare for each test beginning at least a week before the exam.

Cheating or copying:

If a student is found guilty of copying homework or cheating in tests, he/she will receive “FF” grade for the course.

CE 361 - LABORATORY WORK SYLLABUS

Lab Hours: Laboratory studies will be in groups (At least 4 students at each lab group). Lab work will take place on Friday 15:30-17:15. Hours of the groups will be announced one week after the start of the class.

Lab Book:

- Handouts will be uploaded on IYTE cloud-lms (<https://cloud-lms.iyte.edu.tr/>) before each experiment in the lab.
- Understanding Soil Mechanics, Jack Roberts, Thomson Publishing Comp.

Lab Assignments:

- After each lecture, all groups will meet in the geotechnical engineering lab. The procedure of experiments that will be conducted in that week will be explained by TAs.
- Handouts and group schedules will be uploaded on CMS before each experiment in the lab.
- Each group will perform their experiment according to their group schedule. Attendance is mandatory.
- Each group will have assigned a TA. During tests, TA who is responsible of the group will control and guide the progress of the tests. Ask questions.
- Each student will submit a lab work report individually for each test. The format of the reports will be uploaded on IYTE cloud-lms. Attach any excel sheet that you think is required.
- Reports submitted after deadline **will not be accepted** and the test will be considered as not performed. Please keep in mind the deadline of the experiments.

Lab Schedule: Each student is required to participate in a total of 7 laboratory experiments during the semester. The following experiments will be carried out during the semester:

1st week: Introduction to the geotechnical laboratory – Safety instructions

2nd week: Specific gravity test

3rd week: Sieve analysis

4th week: Hydrometer test

5th week: Liquid limit and plastic limit tests & CLASSIFICATION OF SOIL

6th – 7th week: Constant head permeability test

8th week: Compaction Test

9th week: Sand cone test

Students are expected to familiarize themselves with each experiment before the appropriate laboratory period.

REPORTS

Each group will prepare a report on each experiment actually performed. These reports are to be bounded in a report folder and handed in within one week after the lab. They will be marked and handed back during the following laboratory period.

Every lab work report is to contain the following:

On the Report Cover:

The number and name of the course
The group number and name of the students.

Page 1: Title Page

The number and name of the experiment
When and where the test was performed

Page 2: Purpose and Scope

This brief paragraph should contain the name of the experiment and the reason for performing this experiment.

The Procedure

In another brief paragraph, make reference to the procedure used, such as that given in the laboratory manual, and also make reference to any departures from the procedure as indicated by the supplementary notes or by the instructor.

Following pages:

Results:

This should include the final quantities obtained from the experiment. This may be in graphical or tabular form, whichever is appropriate. All graphs must have a title, the coordinates of which must be clearly identified. All curves must also be labeled. Graphs should also include the soil tested and any other information that is necessary to understand and appreciate the meaning of the graph.

Discussion:

This should include a full discussion of the significance and usefulness of the results, and probable accuracy, sources of error and limitations of the experiment and theory. Make a statement as to the reasonableness of your results. Also answer any questions, if assigned by the instructor.

Appendix (in the following order)

Data sheets

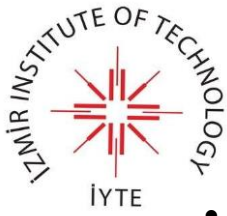
Sample calculations

Show work clearly and note any assumptions. Reference should be given for any formulas used.

Finally, the relevant supplementary instructions should be bound in at the end of the report.

NOTES:

- The order of presentation in laboratory reports must be outlined above.



- Please print out the **laboratory report grading sheet** at the end of each experiment report.

LABORATORY REPORT GRADING SHEET

POINTS _____/100

Experiment No. _____

	Points/Maximum
General presentation	<u> /10 </u>
Summary	<u> /10 </u>
<i>Prime findings contained in the report</i>	
Purpose and Scope	<u> /10 </u>
<i>Test, reason and performing, soil description</i>	
Procedure	<u> /10 </u>
<i>Test references, modifications</i>	
Results	<u> /20 </u>
Discussion	<u> /30 </u>
<i>Accuracy, errors, limitations, significance and usefulness of results, practical applications, recommendations if any, and reasonableness of results.</i>	
Date, sample calculations	<u> /10 </u>
Deduction:	
Poor English	<u> /-20 </u>
Not cleaning apparatus	<u> /-10 </u>

INSTRUCTOR'S REMARKS: