

THE UNIVERSITY OF TOLEDO
CIVE 3210:001/3 Soil Mechanics
Fall Semester, 2009
Lecture MW 9:00 - 9:50, PL 2450
Laboratory (001) M 11:00 – 12:50, NI 1024
Laboratory (002) W 11:00 – 12:50, NI 1024
Laboratory (003) M 1:00 – 2:50, NI 1024

Instructor: Dr. Andrew G. Heydinger
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<http://www.eng.utoledo.edu/civil/heydinger/soil%20mechanics/SMsyl.pdf>

Office Hours: M 10:00 – 11:00, W 1:00 - 2:30, other times as necessary.

Objectives: At the conclusion of this course, you should be able to demonstrate knowledge of how civil engineers treat soils as an engineering material. You will need to describe the geologic origins of soils and the effects of geologic processes on the in situ condition of soils. You will need to perform calculations to determine soil phase relationships. You will have to be able to classify soils. You will have to apply fundamental theories to describe engineering behavior for such engineering problems as soil compaction, soil volume change, flow of water in soils, effective stress, consolidation and soil shear strength. You will also have to be able to conduct laboratory soils tests and the required calculations.

Text: Fundamentals of Geotechnical Engineering, 3rd Edition by Braja M. Das (Required).

Prerequisites: CIVE 1160 and CIVE 1170.

Lectures: Lectures cover topics included in the texts and also detail information necessary for the understanding of the behavior of soils that cannot adequately be covered in textbooks. Therefore attendance and participation in all lectures is strongly recommended.

Assignments: Assignments are essential to learning the material and to understanding soil behavior. Assignments should be neatly presented on one side of the paper only. Problems should be clearly identified with the work shown and the answers underlined. You may consult with your classmates on assignments but only your own work may be submitted, particularly if software solutions are developed. Homework will be collected as noted in class. Late assignments will not be accepted without a valid excuse.

Course Grade:	Midterm Exams	40% (2 @ 20% each)
	Final Exam	25%
	Homework	15%
	Laboratory	20%

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<u>DATE</u>	<u>DAY</u>	<u>MEETING</u>	<u>SUBJECT</u>	<u>READING ASSIGNMENTS</u>	<u>WRITTEN ASSIGNMENTS</u>	
8/24/09	M	1	Introduction	Chapter 1		
26	W	2	Geologic Formations	2.1 – 2.8, Geology Notes		
31	M	3	Clay Minerals, Structure	2.9 - 2.11, 4.10		
9/2/09	W	4	Grain Size Distributions	2.12 – 2.13	2.1, 2.3, 2.7, 2.8, 2.13	
7	M	LABOR DAY – NO CLASSES				
9	W	5	Phase Relationships	3.1 - 3.2	3.1, 3.3	
14	M	6	Phase Calculations	3.3 - 3.4	3.5, 3.7, 3.11	
16	W	7	Classification Tests	3.5 – 3.8	3.13	
21	M	8	Classification Systems	3.9	3.16 (Odd soil nos.)	
23	W	9	Soil Classification	3.9	3.17 (Odd soil nos.)	
28	M	10	Soil Compaction	4.1 – 4.2	4.1, 4.2	
30	W	11	Compaction Tests	4.3 – 4.4	4.5	
10/5/09	M	FALL BREAK – NO CLASSES				
7	W	12	Groundwater and Head	5.1 – 5.3	5.1, 5.3	
12	M	13	1 st EXAM			
14	W	14	Hydraulic Conductivity	5.4 – 5.5	5.5, 5.7, 5.9	
19	M	15	2-D Flow	5.7 – 5.8	5.13, 5.18	
21	W	16	Flow Nets	5.9	5.21	
26	M	17	Modeling Flow	Handout	Handout	
28	W	18	Groundwater Problems			
11/2/09	M	19	Vertical Soil Stress	6.1 – 6.4	6.1, 6.4, 6.5, 6.7	
4	W	20	Stress Due to Loading	6.6 – 6.11	6.9, 6.10, 6.13, 6.17 9	
9	M	21	Rectangular Area	6.12, Handout	6.20	
11	W	VETERANS DAY – NO CLASSES				
16	M	22	Consolidation Theory	7.1 – 7.3	7.1	
18	W	24	Consolidation Testing	7.4 – 7.5	Lab Spreadsheet	
23	M	24	2 nd EXAM			
25	W	THANKSGIVING BREAK – NO CLASSES				
30	M	25	Consolidation Settlement	7.6 – 7.8	7.3, 7.5, 7.8	
12/2/09	W	26	Consolidation Rate	7.9 – 7.11	7.11, 7.15	
7	M	27	Shear Strength Theory	8.1 – 8.3	8.1, 8.3	
9	W	28	Shear Strength Testing	8.4 – 8.6	8.5, 8.8, 8.9, 8.10	
				8.7 – 8.9	8.14, 8.17, 8.19	
12/15/09	T	FINAL EXAM 10:15 - 12:15 a.m.				

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Attendance at the Soil Mechanics laboratories is mandatory. Each student should arrive promptly at the beginning of the session prepared to begin the laboratory. Students will be assigned to a group at the first laboratory meeting. Students will work with the same group throughout the term. The instructor will provide a Soil Mechanics Laboratory Manual for the course via the Internet web page for the course, accessible from the links on the laboratory schedule below. In order to prepare for the laboratories, each student must read the respective chapters in the text and the Soil Mechanics Laboratory Manual before coming to the labs. Recitation sessions indicated below supplement lectures.

LABORATORY SCHEDULE

8/24	8/26	Water Content
8/31	9/2	Specific Gravity
9/14	9/16	Hydrometer Analysis
9/21	9/23	Sieve Analysis
9/28	9/30	Atterberg Limits
10/12	10/14	Standard and Modified Proctor Tests
10/19	10/21	Permeability Test
10/26	10/28	Flow Nets (Computer Lab)
11/2	11/4	Subsurface Stress (Recitation)
11/9 (001, 003)		Consolidation Test
11/16 (002)		Consolidation Test
	11/18	Settlement Calculations (Recitation)
11/23		Settlement Calculations (Recitation)
11/30	12/2	Unconfined Compression Test
12/7	12/9	Shear Strength (Recitation)

A short report is required for each laboratory from each student, excluding recitation sessions, consisting of the following components.

- 1) Purpose of the Test
- 2) Description of the Test Procedure (Describe the procedures in a paragraph, i.e. do not list procedures out.)
- 3) Calculations (Include a complete set of sample calculations.)
- 4) Discussion of Results (Include references to any tables or figures.)
- 5) Conclusions

The file below contains all figures and tables to assist in the report preparation.

MS EXCEL file: [SMTables&Figures.xls](#)

The laboratory reports are due at the beginning of the following laboratory or during the next week following the laboratory, if no labs are held that week. **Attendance in the laboratory and a laboratory report must be submitted in order to receive a grade in the laboratory.**