CVLE 322
Soil Mechanics

Lecture:	Tu, Th	11:00 - 12:15 a.m.	Room TBA
Lab:	Tu	2:00 - 4:50 p.m.	S. Charleston Lab

Credits: 3 credits lecture, 1 credit lab.

Text: Fundamentals of Geotechnical Engineering by G.M. Norris

Instructor: Mohamed Ashour

Phone: (304) 442-3834 (office)

Office Hours: Will be scheduled in the class.

Grading: 4 credits

Exam 1	20
Exam 2	20
Exam 3	25
Homework	15
Lab Reports	20
	100

Attendance: An unexcused absence in the lab will result in a 50% penalty on the corresponding lab report. Legitimate conflicts with a particular lab should be cleared with the instructor prior to that lab.

Objectives:

To introduce the student to fundamentals of soil mechanics, soil classification, soil testing, laboratory data processing, use of experimental data in geotechnical engineering calculations, and report writing.

Outcomes

1. To understand the geological and physical origins of soils, and to describe soils in terms of their grain distribution, plasticity, and weight-volume relationships.
2. To characterize soils by grain size analysis and plasticity and classify soils for engineering purposes.
3. To characterize the states of soils using weight- volume relationships.
4. To understand soil compaction and its effect on soil performance.
5. To analyze the flow of water and porewater pressure through soils using flow nets (seepage).
6. To calculate seepage forces on hydraulic structures.
7. To understand and calculate effective and total stresses in soil and resulting settlements.
8. To use soil properties from laboratory test for calculation of settlement.

9. To measure shear strength properties from laboratory tests.
10. To understand the concepts of lab testing and collecting/presenting soil properties for engineering purposes.

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Lecture Outline

Lecture Period	Topic	Reading Assignment (Chap. & Sect.)	Problem Set
1	Weight-volume relationships	1.1	
2	Weight-volume relationships		1
	SI units	1.2	
3	Grain size analysis	2.1	
4	Grain size; Hydrometer test		
5	Hydrometer test; Cohesive vs. cohesionless soils	2.2	2
6	Cohesive vs. cohesionless soils Atterberg limits; Activity		
7	Soil classification	4.1	
8	Soil classification		3
	Soil description; D_r and I_L; Fabric	4.2	
9	Capillary rise; Capillary fringe	5.1	
10	Compaction	6.1	
	Compaction		4
11	Frost heave; Soil stabilization	5.2, 6.2	
12	Subsurface exploration	3.2	+
13	Subsurface exploration END OF EXAM I MATERIAL (Test in lab period 7)		
14	Permeability, Darcy's law	7.1	
	One-dimensional flow		5
15	Two-dimensional flow	7.2	
16	Flow Net		
17	Effective stress principle	8.1	
18	Total, porewater pressure and effective stress diagrams	8.2	6
19	Seepage effects	8.3	
20	Consolidation settlement	9.1	
21	Consolidation settlement		7
21	Stress distribution	9.2	
22	Immediate settlement; Total settlement		
23	Time rate of settlement	9.3	
24	Time rate of settlement END OF EXAM II MATERIAL (Test in lab period 12)		

25	State of stress; Mohr Circle Mohr circle; Pole	10.1	
26	Shear strength evaluation Shear strength evaluation		8
27	Shear strength of cohesionless material	10.2	
28	Shear strength of cohesionless material		
29	Shear strength of saturated clay Shear strength of saturated clay	11.1	
30	Application of strength envelopes to problems of stability	11.2	9

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Lab Schedule

Lab Period	Tasks	Lab Report
1	Introduction, natural soils	
2	Sieve analysis, hydrometer test	
3	Liquid limit, plastic limit	1
4	Compaction and field density tests; Specific Gravity	
5	Compaction and field density tests; Specific Gravity	2
6	Exam I	
7	Field demo of subsurface exploration (both labs to visit field site)	
8	Permeability test and flow net construction	
9	Analysis of stability under seepage conditions, filter design	3
10	Consolidation test	
11	Exam II	
12	Consolidation test data reduction	4
13	Triaxial test: Section 11.3	
14	Review (Exam III in Final period)	