CE 467L: GEOTECHNICAL ENGINEERING
Spring 2013 Course Information

Course description:
The course aims to acquaint the student with the concept of "soil" as an engineering material and the properties and methods used to characterize soil for Geotechnical analysis and design. The course will cover terminology and parameters used to characterize and classify soils; stresses and stress conditions in soils; factors affecting soil strength and stress-strain behavior; seepage and water flow through soils and their effects on soil stresses and strength; deformation and settlement characteristics of soils; lateral earth pressure, bearing capacity and slope stability concepts.

Course Objectives:
- Learn the common terminology used in the field of Geotechnical Engineering
- Develop a feel for relevant factors to consider in analyzing soil behavior
- Understand the interaction between water and soil and the effects of static vs. flowing water on soil strength
- Understand the fundamental differences between behaviors of sands and clays and between total & effective stresses
- Become familiar with common laboratory tests to classify soils and characterize soil properties
- Develop an appreciation for the inherent variability of soils and the scatter produced in geotechnical data and the challenges this poses to Geotechnical analysis and design

Instructor: Dr. Amy L. Rechenmacher arechenm@usc.edu KAP 230C (213) 740-3615
Instructor Office Hours: TBA

Lectures: T,Th 11:00 a.m. – 12:15 p.m., location TBA

Laboratories: T 12:30-2:20, W 9-11, W 1:30-3:30, Th 3:30-5:30, F 10-12; all in KAP B40

Teaching Assistants: TBA

TA Office Hours: TBA

Course Website: Blackboard: https://blackboard.usc.edu/

Grading:						
	Homework	17.5%	Exam 1	20%	Final Exam	25%
	Laboratory	17.5%	Exam 2	20%		

Homework Guidelines:
1. Homework is due at the *end* of class on the due date, typically Thursdays. Late homework will *not* be accepted unless prior arrangements are made with the professor. Homework assignments will be posted on Blackboard as they are assigned. Homework solutions will be posted following their due dates.
2. **All homework *calculation-type problems and graphs* must be written on *Graph or Engineering Paper***
3. Homework should be neat and clearly legible. Lines meant to be straight should be drawn with a ruler.
4. Axes on graphs should be labeled and include proper units.
5. If you make your graphs using a spreadsheet program (i.e. Excel), *use care in fitting trendlines to data. This topic will be discussed in detail during the lectures.*

Statement for Students with Disabilities
Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity
USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. The USC Viterbi School of Engineering adheres to the University's policies and procedures governing academic integrity. Viterbi students are expected to be leaders at USC and should be aware of and observe academic integrity standards in all their courses and activities. These standards will be enforced in this class on all assignments. (Resources and more details are available at http://viterbi.usc.edu/academics/integrity/).

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Spring 2013
**** SYLLABUS****

Instructor: Dr. Amy L. Rechenmacher, KAP 230C, 213-740-3615, arechenm@usc.edu

Textbooks: Craig's Soil Mechanics, 8th ed., by J.A. Knappett and R.F. Craig, Spon Press
Experimental Soil Mechanics, by J.P. Bardet, Prentice Hall ***(available on Blackboard)***

Week No.	Period No.	Date	Chapter/ Section*	Topic
1	1	1/15	1.1–1.2	Introduction, nature of soil, weathering, clay mineralogy
	2	1/17	1.3–1.4	Particle size, classification tests, plasticity
2	3	1/22	1.5, B 116-127	Soil description and classification (USCS)
	4	1/24	1.6	Phase relations
3	5	1/29	1.6–1.7	Phase problems, compaction
	6	1/31	1.7, 2.1	Compaction, cont'd; Soil water
4	7	2/5	2.1, 6.2	Bernoulli equation, 1-D flow, piezometers
	8	2/7	2.2	1-D flow problems; Darcy's Law, permeability
5	9	2/12	2.3	2-D seepage, seepage theory
	10	2/14	2.3–2.4	Flow nets, 2D seepage problems
6	11	2/19	2.4, 3.1–3.2	2-D seepage problems, cont'd; Effective stress
	12	2/21	3.2, 3.4	Effective stress concepts
7	13	2/26	3.6–3.7	Effect of seepage on effective stress
	14	2/28		**EXAMINATION 1: Ch 1-2**
8	15	3/5	5.3, B 239-243	Shear strength of soil, Mohr circle
	16	3/7	5.3, B 239-243	Mohr-Coulomb model, shear strength parameters
9	17	3/12	5.4, B 265-276	Shear strength tests
	18	3/14	5.4, B 265-276	Shear strength tests, cont'd
10		3/18 – 3/22		SPRING BREAK – No class
11	19	3/26	5.5, B 370-383	Shear strength of sands
	20	3/28	5.6, B 383-400	Shear strength of clays
12	21	4/2	4.1–4.2	Consolidation settlement, oedometer test
	22	4/4	4.3	Consolidation: 1-D settlement calculations
13	23	4/9	4.4–4.5	Time rate of consolidation: Terzaghi's 1D Theory
	24	4/11		**EXAMINATION 2: Ch 3 & 5**
14	25	4/16	4.6	Coefficient of consolidation
	26	4/18	4.4–4.5	Time rate of consolidation, examples
15	27	4/23	8.5–8.6	Stresses/displacements due to surface loads
	28	4/25	11.1–11.3	Lateral earth pressure
16	29	4/30	11.1–11.3	Lateral earth pressure
	30	5/2	12.1–12.3	Slope stability
		Tues May 14 11 am –1 pm		**FINAL EXAM (cumulative)**

***** Refers to section numbers in Craig; numbers following a "B" refers to pages in Bardet.

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LABORATORY INFORMATION

Instructor: Dr. Amy Rechenmacher, KAP 230C, 213-740-3615, arechenm@usc.edu
Laboratory T.A.'s: TBA

Text: Bardet, J.P. Experimental Soil Mechanics, Prentice Hall (***available on Blackboard!!***)

Laboratory Room: KAP B40

Laboratory Schedule:

Lab No.	Dates	Laboratory/Discussion	Reading (pages in Bardet)
0	Tues Jan 15 – Fri Jan 18	NO LAB	
1	Tues Jan 22 – Fri Jan 25	Sieve Analysis	9 - 30
2	Tues Jan 29 – Fri Feb 1	Liquid Limit	75 - 91
3	Tues Feb 5 – Fri Feb 8	Compaction	147 - 165
4	Tues Feb 12 – Fri Feb 15	Permeability	177 - 206
	Tues Feb 19 – Fri Feb 22	*Discussion Section**	
	Tues Feb 26 – Fri Mar 1	NO LAB	
	Tues Mar 5 – Fri Mar 8	*Discussion Section**	
5	Tues Mar 12 – Fri Mar 15	Unconfined Compression	265 – 276, 404 – 420
	Tues Mar 19 – Fri Mar 22	SPRING BREAK: NO LAB	
6	Tues Mar 26 – Fri Mar 29	Direct shear	421 – 442
	Tues Apr 2 – Fri Apr 5	*Discussion Section**	
	Tues Apr 9 – Fri Apr 12	NO LAB	
7	Tues Apr 16 – Fri Apr 19	Consolidation	297 - 359
	Tues Apr 23 – Fri Apr 26	Consolidation, cont'd	297 - 359
	Tues Apr 30 – Fri May 3	*Discussion Section**	

* location TBA

Lab rules:

1. In each lab section, students will be divided into "groups" of 3-4 students. Attendance is ***required*** for ***all*** group members for all laboratories. Only pre-arranged absences will be accepted. One lab report per lab group is required, due the following lab period. Students who do not attend lab due to a pre-excused absence must still contribute to report writing.
2. Read the appropriate laboratory procedure before the laboratory period. Laboratory procedures are available through Blackboard. Print out the procedure and bring it to lab with you.
3. THE LABORATORY MUST BE CLEANED FOLLOWING EACH LAB PERIOD. This includes washing/rinsing equipment, wiping off the lab tables, storing soil samples.
4. NO FOOD OR DRINK IS ALLOWED IN THE SOILS LABORATORY AT ANY TIME.

Laboratory Reports:

1. One report per group is required. The group as a whole is responsible for: i) ensuring that work is fairly distributed among group members; and ii) checking each others' work.
2. *Reports must be signed by all group members upon submission*. Anyone not signing the report will not be given credit.
3. Reports must be neat, well organized, and professionally presented.
4. Report organization:
   - Cover page: Title of experiment, course name and number, date lab performed, date report submitted, names and signatures of group members performing the lab.
   - Introduction: Offer a brief description of the purpose of the test, the basic principles used to develop test measurements, and how the results may be used in geotechnical practice.
   - Procedure and Material Description: If you followed the procedure outlined in the text, then you only need to reference it, highlighting any modifications/adjustments. If you used a different procedure, then state the steps you followed. ***Describe the soil tested*!**
   - Results: Here is where you *summarize* the data you collected and analyzed (note, raw data is presented in the appendix, see below), and the methods used for analysis. Sample calculations *must* be included, as well as any required graphs and/or tables of data used in your evaluation. Here, summarize *clearly* the material or behavioral parameters you obtained.
   - Discussion of Results: Repeat your findings here, and discuss if they make sense: i.e., how they relate to information discussed in class and/or in the textbook. Here, also offer a discussion of possible sources of error, accuracy of the test method, effects of the experience of the testers, and anything else noteworthy during the test.
   - References: (*only if applicable)*.
   - Appendix: Raw data taken during the test.
5. All graphs and tables should be labeled by way of an assigned a figure/table number, numbered in the order in which they appear in the report; the report text then should reference the relevant table/figure number. Example: "The compaction curve for the five trials is shown in Figure 2." Place figure titles directly *below* the figures, and table titles directly *above* the table.
6. Graphing etiquette:
   a. All graphs should be drawn or plotted on lined graph paper or generated by Excel or the graphing program of your choice.
   b. Include grid lines to help enable proper interpretation of graphical parameters.
   c. Label all graph axes and include proper units.
   d. Size all graphs large enough to enable proper data interpretation. **Graphs should generally be about 1/2 to 1 full page in size.**
   e. Arrange the axes data ranges so that the data you are plotting will be centered on the graph. For instance, if y-axis data range from 10 to 14, do NOT plot the the y-axis range from 0 to 15, as all the data points will be "scrunched" together in the top part of the graph!
7. Reports are due the following lab period after the lab was performed (one week later), at the beginning of class. A 50% penalty will be applied to late reports, unless prior arrangements are made.