UNIVERSITY OF MARYLAND
ENCE 444
LABORATORY CHARACTERIZATION OF GEOMATERIALS

Instructor : Dr. Ahmet H. Aydilek
Office: 1163 Martin Hall
Lecture: T 9:30 am -10:30 am
Laboratory: W 12 noon - 2 pm (Soils Lab)
Office Hours: T 10:30 am-12:30 pm
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Textbook: Bowles, J.E., 1992, *Engineering Properties of Soils and Their Measurement,* 4th Edition, Mc-Graw Hill, NJ.

Teaching Assistant: Mehmet Melih Demirkan
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E-mail: demirkan@umd.edu

Course web page: https://bb.eng.umd.edu

References

- Das, B.M., 2001,*Soil Mechanics Laboratory Manual,* 6th Edition, Engineering Press, Inc., CA.
- American Society of Testing Materials (ASTM), 2005, *Annual Book of ASTM Standards, Section 4, Volumes 04.08 and 04.09; Soil and Rock, Building Stones* Philadelphia, PA.
- Bardet, Jean-Pierre, 1997, *Experimental Soil Mechanics*, Prentice-Hall, Inc., NJ
- Coduto, D.P., 2005, *Geotechnical Engineering: Principles and Practices*, Prentice Hall, NJ.
- Holtz, R.D. and Kovacs, W.D., *An Introduction to Geotechnical Engineering,* Prentice-Hall, New Jersey.
- Das, B., Principles of Geotechnical Engineering, 5th ed.,Brooks/Colle Publishers.

Introduction and Objectives

Laboratory Characterization of Geomaterials is a second course in a field called geotechnical engineering in the Department of Civil and Environmental Engineering. In this course, index and engineering properties of soil are determined through a variety of laboratory test procedures, and the interpretations of these tests are made.

The course can be divided into two parts. Part I includes the test methods to determine the index properties of soils, such as Atterberg limits, grain size distribution, specific gravity. Part II includes the tests describing the engineering properties of soils, such as permeability (hydraulic conductivity), compaction, soil strength and compressibility (consolidation).

The aim of this course is to enable the student:

- to be able to perform soils tests to determine the physical and engineering properties of soils
- to learn how to use the results of these tests in engineering design

The instructor hopes that each student will leave this course with at least an elementary understanding of the soil testing, the standard analyses performed by a geotechnical engineer and the qualitative aspects of soil behavior, which are used in the analysis of problems in geotechnical engineering.

Grading Scheme

Grades will be based according to the following scheme:

Exams- each 15%

Virtual Labs-20%

Laboratory Reports- 50%

A letter grade will be given at the end of the course based on distribution of the student grades.

Reports &Homework Assignments

The due date for the reports and homework assignments will be specified by the instructor. Reports should be turned in to the teaching assistant at the beginning of the lab on the assigned due date. Do not place reports or homework assignments in my mailbox or under my door.

If the report or homework assignment is turned in late, the student will receive a **zero** for the assignment.

Students are expected to perform their work neatly and in an organized fashion. Any work which is sloppy, difficult to read, or difficult to understand will receive a reduced grade. Finally, it is the responsibility of the student to determine the correct solution of the problems, which contained errors.

Exams

Two exams will be held during the semester. The exams are scheduled for **Wednesday, October 25 and Tuesday, December 12** and will be held **in class**. **Prior consent of the instructor or a doctor's certificate from a hospital is the only satisfactory excuse from the exams.**

Reading Assignments

Students are responsible for having a good knowledge about the laboratory test procedure before coming to the lab by reading the text and the handouts distributed in

class. In most cases, the laboratory procedures will not be discussed in detail in the lecture.

Virtual Labs and Lab Reports

The students will perform the tests as individuals or in groups assigned by the teaching assistant. The reports should be written each student.

In addition to the traditional lab format (hands on experience) we will have virtual lab. 20% of the final course grade will be based on the virtual lab.

The virtual lab is all-web based and the registration fee is $15/semester. Go to http://www.yourlabs.com/ and register for the virtual labs. The class code is ENCE444-Soils Lab. After registering, click on the tab with the label "labs" - the second tab shaded with a grey background. It is towards the middle of the page. A table will open with all the labs and various control fields. You can then run the lab yourself (anytime anywhere-all you need is internet access). Contact yourlabs@yourlabs.com if you have any questions.

You are required to complete each virtual lab on Tuesday before coming to the wet lab on Wednesday. For each lab, you need to complete "Pretest", "Run test" and "Quiz" options. You will be given a score (by the software) for each section and these scores will be sent to the instructor automatically. I need to receive the score of each virtual lab before its corresponding wet lab (that means I need to get your score before Wednesday morning and preferably Tuesday night). I will reduce your final score for the virtual lab **by 50% for the first late day** (i.e., starting 12 noon on Wednesday) **and no score will be given thereafter.**

Schedule and Office Hours

The class will ordinarily meet on Tuesdays. However, I do travel for the other responsibilities of my job and thus will miss some of the lectures. These lectures will be made up at times that are acceptable to most, but not necessarily all students.

Regarding office hours, please note that there will inevitably be times during the semester when scheduled office hours conflict with faculty meetings, travel, etc. I will try to notify the students via e-mail about any changes ahead of time.

Code of Academic Integrity

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu.

To further exhibit your commitment to academic integrity, remember to sign the Honor Pledge on all examinations and assignments: "I pledge on my honor that I have not given or received any unauthorized assistance on this examination (assignment)."

Special Arrangements

If you observe a religious holiday and would like to ask for a change in your schedule, please inform me at least 3-4 weeks ahead of it. Also, I will make every effort to accommodate you if you need a special arrangement due to your disability.

SCHEDULE FOR ENGINEERING SOIL TESTS (ENCE444)

Session		**Topic**
1 (Sep 5)	Lecture	Introduction
	Lab	Lab Report Writing Guidelines
2 (Sep 12)	Lecture	Atterberg limits
	Lab	Atterberg limits
3 (Sep 19)	Lecture	**NO LECTURE**
	Lab	**NO LAB**
4 (Sep 26)	Lecture	Compaction
	Lab	Compaction
5 (Oct 3)	Lecture	Relative Density
	Lab	Relative Density
6 (Oct 10)	Lecture	Field Density
	Lab	Field Density
7 (Oct 17)	Lecture	CBR
	Lab	CBR
8 (Oct 24)	Lecture	Review (tentative)
	Lab	**EXAM 1**
9 (Oct 31)	Lecture	Unconfined Compression
	Lab	Unconfined Compression
10 (Nov 7)	Lecture	Direct Shear
	Lab	Direct Shear
11 (Nov 14)	Lecture	Direct Shear
	Lab	Direct Shear
12 (Nov 21)	Lecture	Hydraulic Conductivity
	Lab	Hydraulic Conductivity
13 (Nov 28)	Lecture	Consolidation
	Lab	Consolidation
14 (Dec 5)	Lecture	Consolidation
	Lab	Consolidation
15 (Dec 12)	Lecture	**EXAM 2**
	Lab	Triaxial Test Demo

REPORT DUE DATES (All reports should be submitted to the Teaching Assistant)

Lab	**Due date**
Atterberg limits	Sep 20
Compaction, Relative Density & Field Density	Oct 18
CBR	Nov 1
Unconfined Compression & Direct Shear	Nov 22
Hydraulic Conductivity	Nov 29. Data analysis but no report.
Consolidation	Dec 13

VIRTUAL LAB DUE DATES

(All labs should be completed before the lab starts at 12 noon on Wednesday)

Lab	**Due date**
Casagrande Limit, Plastic Limit and Shrinkage Limit	Sep 13
Compaction	Sep 27
Sand Cone (Field Density)	Oct 11
Direct Shear	Nov 8
Hydraulic Conductivity (Both constant head and falling head)	Nov 22
Consolidation	Nov 29
Triaxial	Dec 13