

UNIVERSITY OF MARYLAND

ENCE 340-FUNDAMENTALS OF SOIL MECHANICS

Instructor : Dr. Ahmet H. Aydilek

Office: 1163 Martin Hall

Office Hours: 1:30 to 3:30 pm on Tuesday; 2:30 to 3:30 pm on Thursday

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Textbook: *Geotechnical Engineering: Principles and Practices* by Donald P. Coduto, Prentice Hall, NJ, 1999.

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

References

Holtz, R.D. and Kovacs, W.D. (1981), *An Introduction to Geotechnical Engineering*, Prentice-Hall, New Jersey.

Das, B. (1997), *Principles of Geotechnical Engineering*, 4th ed., PWS-KENT.

Introduction

Soil Mechanics is the first course in a field called Geotechnical Engineering in the Department of Civil and Environmental Engineering. The term soil mechanics refers to the application of the mechanics of materials and fluids to describe the behavior of soils. In this course, we will study soil mechanics, but we will also survey some topics of Geo Engineering in a less rigorous and brief manner.

More than many other branches of engineering, the practice of Geo Engineering requires the use of prudent engineering judgment as well as the application of fundamental mechanics.

The course is divided into two parts. Part I includes the methods used to describe soils qualitatively and quantitatively and the fundamental aspects of the strength, compressibility and hydraulic conductivity of soils. Part II involves some design aspects of Geo Engineering. This part gives recommendations about the use of the properties of soils to analyze problems that are encountered by the engineer, such as earth construction, use of geosynthetics, geoenvironmental applications and the design of retaining walls, foundations, slopes.

Objectives

The aim of this course is to enable the student to:

- list the salient engineering properties of soils and their characteristics,
- describe factors, which control the properties of soil,
- list methods of determining the properties of soils,
- list basic areas of Geo Engineering that were covered in the course and how problems in these areas are tackled,
- perform elementary analyses in each area described in the course and understand the limitations to these analyses.

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

Grading

Homework Assignments

The due date for the homework assignment that is required for each unit will be specified by the instructor. Homework should be turned in at the beginning of the class on the assigned due date. Do not place homework in my mailbox or under my door.

Each homework assignment will comprise 4-5 questions. The answers for all the questions will be posted on the course web page and the students are responsible for all the materials posted. If the homework is turned in late, the student will receive a **zero** for the assignment. Therefore, even not completed, the assignment should be turned in on time to get a partial credit, which is better than getting a zero.

Students are expected to perform their homework neatly and in an organized fashion. Any homework 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 **October 2 and November 6** and will be held **during the class period**. A final exam will also be given at the end of the semester. The date of the final exam will be announced during the semester. If the student misses the exam, he/she will receive a **zero** for that exam. Therefore, even if he/she is not ready, the student is advised to show up for the exam.

Prior consent of the instructor or a doctor's certificate is the only satisfactory excuses from the exams and assignments.

Grading Scheme

Grades will be based according to the following scheme:

Exams, each 25%

Homework 25%

It should be noted that the effort a student puts into performing and understanding the homework is often reflected in the student's performance on the exams.

Reading Assignments

Students are responsible for all material in the assigned readings. The material readings cover will not necessarily be discussed in detail in the lecture.

Schedule and Office Hours

The class will ordinarily meet on Tuesdays and Thursdays. However, I do travel for the other responsibilities of my job and thus will miss some 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.

Special Arrangements

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

SCHEDULE FOR FUNDAMENTALS OF SOIL MECHANICS (ENCE340)

PART - I. PRINCIPLES OF SOIL MECHANICS

UNIT A. Soil Genesis, Soil Composition and Classification- 5 Lectures

- Engineering Geology Chapter 2 (partly)
- Soil Composition, Chapter 4
- Soil Classification Chapter 5

UNIT B. Flow of Water in Soils- 3 Lectures

- Groundwater-Fundamentals Chapter 7
- Groundwater Applications Chapter 8

UNIT C. Stress- 3 Lectures

- Stress Chapter 10

UNIT D. Compressibility and Settlement – 4 Lectures

- Compressibility and Settlement Chapter 11
- Rate of Consolidation Chapter 12

UNIT E. Shear Strength-4 Lectures

- Strength Chapter 13

PART - II. APPLICATIONS IN GEO ENGINEERING

UNIT A. Compaction – 2 Lectures, Chapter 6

UNIT B. Geoenvironmental Engineering – 1 Lecture, Chapter 9

UNIT C. Slope Stability – 2 Lectures, Chapter 14

UNIT D. Geosynthetics – 1 Lecture, Notes

UNIT E. Site Exploration- 1 Lecture, Chapter 3 (if time allows)