

**CE 5352 – Foundation Design II****Instructor:** Soheil Nazarian, Office: A-207, Phone: 747-6911**Class Time:** TR 4:30 -5:50 PM, Classroom Building C204**Office Hours:** Students are always welcome.**Textbooks:** *Duncan, Wright and Brandon*, Soil Strength and Slope Stability, 2<sup>nd</sup> Edition, 2014, Wiley  
*Bowles*, Foundation Analysis and Design, 5th Edition, 1996, McGraw-Hill.  
*Coduto*, Foundation Design, Principles and Practices, 1994, Prentice Hall.  
*Abramson, Lee, Sharma and Boyce*, Slope Stability and Stabilization Methods, 2001, Wiley and *Handouts*.**Course Objective:** The objective of this course is to familiarize the students with the topics related to foundation design aside from shallow and deep foundations. Design of shallow and deep foundations is covered in Foundation Design I (CE 5359). We will concentrate on understanding the behavior and designing retaining structures. We will also extensively study slope stability.**Schedule:** Tentative lecture topics are attached. Reading assignments from your text are indicated. You are expected to read the appropriate before the lecture. Be sure to save the notes, because you will be examined over at least some of their included material.**Grading:** Handing in homework problems on time and class participation will count a maximum of 20% toward your grade. Chapter quizzes will count as 40% of your grade. The comprehensive final examination will count as 40%.**Homework:** *The homework problems will be collected but not graded. The solutions are posted in Room M-105 between 8:00 AM and 5:00 PM except weekends. You can view the solutions by providing your I.D. But you will not be able to check them out to copy in any form or shape. You will lose this privilege if you do not follow these rules.*

Homework is assigned to help you learn the material, not as a means to generate grades. Homework will not be graded mainly to encourage you to do the work. It is acceptable to work with others when discussing methods of attack, but your written work should always be your own. *The homework grade will be based on the grade you earn in the chapter quizzes.*

Homework problems are due at 5:00 PM on Friday the following week. Therefore, you will always have a weekend to work on your problems. Late homework is not accepted. *If you miss two homework assignments, you will be dropped from the course.*

Past experience clearly shows that a student's grade is strongly dependent upon the effort that is put into working and understanding the homework. Although the homework does not directly count towards your grade, in practice it is the single most important factor that will affect your grade. Homework solutions will be available on due dates. We encourage that you team up with your other classmates for this activity.

**Chapter Quizzes:** *There will be a 20 minute or longer quiz after the homework is handed in for a given topic. The quiz will be similar to either the homework problems from*

the previous week or the examples solved in the class or the examples in the textbook.

**Examination:** *Final examination, which is comprehensive, will last 3 hours.* In accordance with University regulations, students who miss examinations will receive grades of zero. Exceptions to this rule will be made only on a carefully considered individual basis and only if the student contacts the instructor before the exam. If you know in advance that you are going to miss an exam, it is your responsibility to inform the instructor before the exam.

**Neatness and Organization:** You will present homework problems in a neat and orderly fashion. On an examination, your work must be easy to follow. However, if you use a calculator and put nothing down on a page but an equation and the answer, you will get no credit. Calculations spread all over an examination page, with an answer suddenly appearing out of nowhere, will also be graded down.

**Class Attendance:** Students are expected to attend all class periods. Those who fail to attend class regularly are inviting scholastic difficulty and, with the approval of the Dean of the College of Engineering, may be dropped from the course with a grade of F for repeated (5 or more) unexcused absences.

**Cell Phones:** It is a very good manner to turn off your cell phones during the class lectures and lab sessions. However, please make sure that you do not have a cell phone or any other electronic item with you during the exam and quizzes.

**Policy on Cheating:** Students are expected to be above reproach in all scholastic activities. Students who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and dismissal from the university. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22). Scholastic dishonesty harms the individual, all students, and the integrity of the university. Policies on scholastic dishonesty will be strictly enforced.

**Final Comment:** Good luck to all of you in this course. Please do not hesitate to ask questions in class, or, if necessary, to see me outside of class. Any specific comments that students may have on how the course might be improved are particularly welcome.

**Lecture Topics****Lecture Topic 1. Introduction and Review**

1.2 Geotechnical Properties of Soil (Chapter 1 Das, pp. 47-58)

**Lecture Topic 2. Lateral Earth Pressures (Chapter 23 Coduto)**

23.1 Horizontal Stresses in Soil  
23.2 Classical Lateral Earth Pressure Theories  
23.3 Lateral Earth Pressures in Soils with  $c > 0$  and  $\phi > 0$   
23.5 Presumptive Lateral Earth Pressures  
23.6 Lateral Earth Pressures from Surcharge Loads  
23.7 Groundwater Effects  
23.8 Practical Application

**Lecture Topic 3. Gravity and Cantilever Retaining Walls (Chapter 24 Coduto)**

24.1 External Stability  
24.3 Internal Stability (Structural Design)  
24.4 Drainage and Waterproofing  
24.5 Avoidance of Frost Heave Problems

**Lecture Topic 4. Sheet-Pile Walls: Cantilevered and Anchored (Chapter 25 Coduto)**

25.1 Materials  
25.2 Construction Methods and Equipment  
25.3 Cantilever Sheet Pile Walls  
25.4 Braced or Anchored Sheet Pile Walls

**Lecture Topic 5. Mechanically Stabilized Earth (Chapter 12 Bowles)**

12.1 Introduction  
12.2 Mechanically Reinforced Earth Walls  
12.3 Design of Reinforced Earth Walls

**Lecture Topic 6. Walls for Excavation (Chapter 14 Bowles)**

14.1 Construction Excavations Text  
14.2 Soil Pressures on Braced Excavation Walls Text  
14.3 Conventional Design of Braced Excavation Walls Text  
14.4 Estimation of Ground Loss around Excavations

**Lecture Topic 7. Cellular Cofferdams (Chapter 15 Bowles)**

15.1 Types and Uses  
15.2 Cell Fill  
15.3 Stability and Design of Cellular Cofferdams  
15.4 Bearing Capacity  
15.5 Cell Settlement  
15.6 Practical Considerations in Cellular Cofferdam Design  
15.7 Design of Diaphragm Cofferdam Cell  
15.8 Circular Cofferdam Design

**Lecture Topic 8. General Slope Stability Concepts (Chapter 6 Duncan and Wright)**

- 6.1 Definition of the Factor of Safety
- 6.2 Equilibrium Conditions
- 6.3 Single Free-Body Procedures
- 6.4 Procedures of Slices: General
- 6.5 Procedures of Slices: Circular Slip Surfaces
- 6.6 Procedures of Slices: Noncircular Slip Surfaces
- 6.7 Assumptions, Equilibrium Equations, and Unknowns
- 6.8 Representation of Interslice Forces (Side Forces)

**Lecture Topic 9. Slope Stability Analysis (Chapter 7 Duncan and Wright)**

- 7.1 Simple Methods of Analysis
- 7.2 Slope Stability Charts
- 7.3 Spreadsheet Software
- 7.4 Computer Programs
- 7.5 Verification of Analyses

**Lecture Topic 10. Dewatering (ERDC)**

- Basic Concepts