CE 443 Foundation Design Spring 2017

Text: Principles of Foundation Engineering 8th ed; Das, 2014
Cengage Learning ISBN:9781305081550

Prerequisites: CE 341, CE 341A.

Objectives: Students will be provided insights into the following foundation design topics - site investigation, selection of foundation types and basis for design, allowable loads, and permissible settlements of shallow and deep foundations, and computations of earth pressure and design of retaining walls.

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Week	Topic
1	Review of Soil Mechanics and Geotechnical Investigations
2	Shear Strength and Bearing Capacity Theory
3	Application of Bearing Capacity Theory
4	Bearing Stresses and Elastic Settlement
5	Consolidation Settlement
6	Design of Shallow Foundations
7	Midterm Examination
8-10	Lateral Earth Pressure and Design of Retaining Walls
11	Pile Foundations- Types and Installations
12	Pile Capacity and Settlements
13	Design/Construction of Pile Groups
14	Design/Construction of Drilled Shafts
15	Final Exam

Attendance: At the start of the semester, students will be placed in groups for class discussion and participation. If you are unable to attend, instructor should be informed prior to the class. It is your responsibility to obtain the materials presented and submit homework as assigned on the date due. It is suggested you contact your group to obtain the materials you missed or send homework to a group member BEFORE it is due.

Your overall grade will be based on the following:
10% - Quizzes
25% - Homework
30% - Midterm
35% - Final

Grading structure:
100 – 90: A 89 – 86: B+ 85 – 80: B 79 – 74: C+ 73 – 70: C 69 – 60: D 59 – 0: F

Absence from 4 or more weeks will result in a failing grade for the course. All examinations will be open book, open notes. Bring your own paper to exams.

Field visits throughout the duration of the class may be organized by the instructor to a “real-world” construction site or investigation area to put theory to practice.

HOMEWORK: Written assignments are to be submitted in class on paper ON OR BEFORE the due date. Electronic submission will not be accepted. Late homework on the due date will incur a 50% deduction, after the due date a 100% deduction will apply. All homework assignments shall be submitted with accompanying figures, tables, drawings, calculations, etc.

Additional requirements and notices:

A. Bring your textbook and a calculator to each class.
B. Students should read the chapter related to the topic that will be covered in the class before the class
C. Students are encouraged to ask questions about the material covered in the class. This will be used as feedback and can be on a topic that was not clearly comprehended.

Note: The NJIT Honor Code will be upheld, and that any violations will be brought to the immediate attention of the Dean of Students. Also, students will be consulted by the instructor and all must agree to any modifications or deviations from the syllabus throughout the course of the semester.

Department of Civil and Environmental Engineering

CE 443 – Foundation Design

Description:

Site Investigations, selection of foundation types and basis for design, allowable loads, and permissible settlements of shallow and deep foundations. Computations of earth pressures and design of retaining walls.

Prerequisites: CE 341 – Soil Mechanics
CE 341A – Soil Laboratory

Textbook(s)/Materials Required:

Principles of Foundation Engineering 8th ed; Das, 2014
Cengage Learning ISBN:9781305081550

Course Objectives:

1. Learn subsurface exploration techniques and apply them to design of foundations and retaining walls.
2. Apply the principles of soil mechanics to design of shallow and deep foundations including bearing capacity and settlement calculations
3. Compute the lateral earth pressure, select size of retaining walls and ensure safety against external forces and moments.

Topics:

Review of Soil Mechanics and Subsurface investigation
Bearing Capacity
Settlement Calculations
Pile Foundations
Pile Groups, Caissons and Drilled Piers
Lateral Earth Pressure Theory
Design of Retaining Walls

Schedule: Lecture Recitation 3 hour class, once a week
Laboratory - none

Professional Component: Engineering Topics (Design)

Program Objectives Addressed: 1, 2

Prepared By: Prof. Meegoda **Date:** 10/08/16

Course Objective Matrix – CE 443 Foundation Design

Strategies and Actions	Student Learning Outcomes	Outcomes (a-k)	Program Objectives	Assessment Methods/Metrics
Course Objective 1: Learn subsurface exploration techniques and apply them to design of foundations and retaining walls				
Present subsurface exploration methods and their applications to engineering designs.	Students will understand and apply subsurface exploration methods in design of foundations.	b, e, k	1	Field visits, homework, quizzes and examinations.
Course Objective 2: Apply the principles of soil mechanics to design of shallow and deep foundations including bearing capacity and settlement calculations				
Present analytical methods to determine bearing capacity of foundations and their settlements.	Students will understand and apply analytical methods in design of shallow and deep foundations.	c, i, k	1	Homework, quizzes, examinations and design projects.
Show empirical methods and those found in codes in design of foundation.	Students will learn the relationship between empirical methods, theoretical concepts and design requirements in codes.	e, k	1, 2	Homework, quizzes, Examinations and design projects.
Help students understand as to what to look for in professional design practice.	Students will develop ability to visualize, formulate, analyze and solve problems in specialty sub-disciplines within civil engineering.	b, c, h, i, o	1, 2	Class/group discussion, homework, quizzes, and examinations.
Course Objective 3: Compute the lateral earth pressure, select size of retaining walls and ensure safety against external forces and moments.				
Present the theory of lateral earth pressure and equilibrium of rigid bodies	Students will understand and use engineering mechanics and soil mechanics concepts in design of retaining walls.	a, c	1	Homework, Quizzes, examinations and design projects.
Help students understand as to what to look for in professional design practice.	Students will develop ability to visualize, formulate, analyze and solve problems in specialty sub-disciplines within civil engineering.	b, c, h, i, o	1, 2	Class/group discussion, homework, quizzes, and examinations.

CEE Mission, Program Objectives and Program Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program objectives are reflected in the achievements of our recent alumni.

1 – Engineering Practice: Recent alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Recent alumni will advance their skills through professional growth and development activities such as graduate study in engineering, professional registration, and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, civic organizations, and humanitarian endeavors.

Our program outcomes are what students are expected to know and be able to do by the time of their graduation:

(a) ability to apply knowledge of math, science, and engineering
(b) ability to design and conduct experiments, as well as interpret data
(c) ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) ability to use techniques, skills and modern engineering tools necessary for engineering practice