

53:139 FOUNDATIONS OF STRUCTURES
Department of Civil & Environmental Engineering
College of Engineering
The University of Iowa
Spring Semester, 2009

Instructor

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Text

Principles of Foundation Engineering, 6th Ed.
Braja M. Das
Thomson-Brooks/Cole Publishers, 2006.
ISBN: 0495082465

Reference Texts (on reserve in Engineering Library)

1. *Princ. of Geotech. Engrg., 6^h Ed.*
Braja M. Das, Thomson, 2006.
2. *Foundations and Earth Retaining Structures,*
M. Budhi, John Wiley, 2008.
3. *The Engineering of Foundations*
R. Salgado, McGraw-Hill, 2008.
4. *Practical Foundation Engineering Handbook,*
2nd. Ed., R.W. Brown, McGraw-Hill, 2001.
5. *Soil Strength and Slope Stability,* J.M.
Duncan and S.G. Wright, John Wiley, 2005.

Course Grading

Homework Assignments	30%
In-class participation	10%
Semester Project	30%
Final Exam	<u>30%</u>
Total	100%

Course Learning Objectives

1. To extend a basic understanding of soil mechanics and structural mechanics to design of structural foundations and retaining structures.
2. To gain familiarity with different types of structural foundations and when each might be used.
3. To understand alternative types of earth retaining structures and their relative advantages and disadvantages.
4. To develop a physical understanding common failure mechanisms and scale effects in geotechnical engineering.
5. To integrate the physical understanding with accepted analysis and design techniques.
6. To understand how soil properties used in analysis are actually measured or estimated.

Tentative Course Schedule:

Period #	Week of:	Topic	Reading Materials
1 2	1/19 – 1/23	Soil Strength, Slope Stability and Seepage Effects Planar and Circular Failure Mechanisms	R1, Ch. 14; or R2, Ch. 3,4, or
3 4	1/26 – 1/30	Slope Stability Analysis with Methods of Slices Slope Stability Analysis with Software, FEM	R3, Ch. 17; or R5, Ch. 3, 6.
5 6	2/2 – 2/6	Subsurface Explorations Methods for obtaining specific soil parameters	Ch. 2, & R2, Ch. 5; or R3, Ch. 7.
7 8	2/9 – 2/13	Shallow Foundations, Definitions, Bearing Failures Terzaghi's Model for Bearing Capacity	Ch. 3 R2, Ch. 7;
9 10	2/16 – 2/20	General Bearing Capacity Equations & Examples Sizing of Foundations; Eccentric Loads	R3, Ch. 10.
11 12	2/23 – 2/27	Settlement of Shallow Foundations on Clays and Sands Scale Effects in Settlements	Ch. 5 & R2, Ch. 7; or R3, Ch. 9.
13 14	3/2 – 3/6	Mat Foundations; Compensation; Rigid/Flexible Assumptions; Alternative Design Methods	Ch. 6 R2, Ch. 9;
15 16	3/9 – 3/13	Active and Passive Earth Pressures on Retaining Structures; Stability Checks; Gravity Systems; Cantilever Walls.	Ch. 7-8; R2, Ch 10,11;
17 18	3/23 – 3/27	Reinforced Earth Structures, Analysis and Design; Practical considerations.	
19 20	3/30 – 4/3	Sheetpile Walls; Construction; Modeling Assumptions; Stability Analysis; Design.	Ch. 9 & R2, Ch. 10
21 22	4/6 – 4/10	Types of Deep Foundations; High & Low Displacement Piles; Skin Friction; End Bearing	Ch. 11 & R2, Ch. 8;
23 24	4/13 – 4/17	Calculation of Pile Capacities; Pile Driving Formulae; Group Effects; Pile Caps;	R3, Ch. 12-15.
25 26	4/20 – 4/24	Settlements of Piles; Lateral Deflections	
27 28	4/27 – 5/1	Drilled Pier and Caisson Foundations Foundations on Collapsible Soils & Highly Compressible Soils	Ch. 12 Ch. 13
29 30	5/4 – 5/8	Project Presentations I Project Presentations II	
Final Exam	5/11	Final Exam Period #4, Monday 2:15-4:15pm	

Homework Assignments and Due Dates

Assignment #	Date Due (Tentative)	Assignment
1	1/28	Writing assignment regarding slope failure(s)
2	2/4	Selected problems on Slope Stability, from Ref. texts.
3	2/11	Subsurface Exploration Assignment
4	2/25	Bearing Capacity of Shallow Foundations
5	3/2	Settlement of Shallow Foundations
6	3/11	Analysis/Design of Mat Foundations
7	4/1	Lateral Earth Pressures and Retaining Walls
8	4/8	Sheetpile Retaining Walls
9	4/22	Pile Foundation Capacities
10	4/29	Pile and Drilled Shaft Foundations
11	5/6	Foundations on Difficult Soils

- With the exception of Assignment #1, all homework should be submitted on engineering paper or unlined plane paper.
- Pay attention to usage of significant figures in your final answers. Reporting of answers with excessive significant figures will be penalized.
- Since the process by which you solve a problem and obtain an answer are as important as your final answer, **neatly** show the major steps in each problem so your logic and reasoning can be followed.