Geotechnical Engineering Fundamentals (E 4241)

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General Information

Time:	Wednesday, 4:10-6:40 p.m.
Room:	535 Mudd Building
Textbook (suggested):	Principles of Foundation Engineering, by Braja M. Das, PWS Publishing Co.
Office:	632 Mudd
Office Hour:	Thursday, 12:00 - 2:00 p.m.

Teaching Assistant:

<u>Grading</u> Homework (20%); Exam (closed book) Midterm Examination (40%); Final Examination (40%)

Course Descriptions

Foundation Engineering: Art or Science?

Classical versus Advanced Method of Analysis/Design

Design Examples

- Review of soil mechanics
- Shallow foundation Bearing capacity and settlement/deformation
- Deep foundation (Piles) Bearing capacity and settlement
- Lateral earth pressure Rankine and Coulomb earth pressure theories
- Gravity and cantilever retaining walls
- Reinforced soil retaining walls
- Sheet pile walls cantilever and anchored
- Braced excavation
- Slope stability

Syllabus Geotechnical Engineering Fundamentals

1 Bearing Capacity of Shallow Foundations

1.1 Introduction
1.2 Limit Analysis (Upper and Lower Bound Solutions)
1.3 Rankine Solution
1.4 Terzaghi General Bearing Capacity
1.5 Meyerhof Equation
1.6 Eccentrically Loaded Foundation
1.7 Sand-Clay Layer System
1.8 Field Correlations

2 Settlement of Shallow Foundations

2.1 Introduction2.2 Elastic Settlement Due to SurfaceLoading2.3 Consolidation Settlement2.4 Stress Increment in the Ground Due toSurface Loading

3 Bearing Capacity of Deep Foundations

3.1 Introduction3.2 Bearing Capacity of Piles3.3 End Bearing (Meyerhof, Vesic, Janbu methods, SPT)3.4 Frictional Resistance (Sand, Clay-lambda, alpha, beta methods)

4 Pile Settlement

4.1 Elastic Solution4.2 Field Loading Test4.3 Pile Group (efficiency, settlement)4.4 Negative Skin Friction4.5 Laterally Loaded Pile

5 Finite Element Analysis of Shallow Foundation

6 Earth Pressure Theories

6.1 Introduction6.2 Coulomb Analysis (active and passive thrusts)6.3 Rankine Analysis (active and passive earth pressures)

7 Retaining Walls

7.1 Introduction - Types of walls and failure modes

- 7.2 Overturning Stability
- 7.3 Direct Sliding stability
- 7.4 Bearing Capacity

8 Geosynthetic-Reinforced Soil Retaining Walls

8.1 Introduction (mechanism of soil reinforcement, construction sequence)
8.2 Design (failure modes, design strength)
8.3 Tieback Analysis (vertical spacing, required length/strength, anchorage length)
8.4 External Stabilities - Overturning, Direct Sliding
8.5 Design Example
8.6 Design Software

9 Sheet Pile Walls

- 9.1 Introduction9.2 Cantilever Sheet Pile Wall sand on clay layer9.3 Cantilever sand over sand layer
- 9.4 Anchoed Sheet Pile Wall
- 9.5 Design Example

10 Braced Excavation

- 10.1 Introduction10.2 Pressure Envelopes
- 10.3 Design Example
- 10.4 Finite Element Analysis of Excavation

11 Slope Stability

- 11.1 Infinite Slope
- 11.2 Francais-Culmann Analysis
- 11.3 Stability Number Method
- 11.4 Method of slices