PURDUE UNIVERSITY FORT WAYNE | Department of Civil and Mechanical Engineering

Course	CE 38000 – Soil Mechanics
Type of Course	Required for Civil Engineering Program
Catalog Description	Introduction to the nature and origin of soil and rocks; engineering classification of soil; soil compaction; permeability and seepage, engineering behavior and proprieties of soils; compressibility; shear strength of soil.
Credits	3
Contact Hours	3
Prerequisite Courses	CE 25200
Corequisite Courses	CE 31800 – Fluid Mechanics, CE 38100 – Soil Mechanics Laboratory
Prerequisites by Topics	Strength of Materials
Textbook	Braja M. Das, *Principles of Geotechnical Engineering*, Brooks Cole/Thompson Publishing Company, Current Edition.
Course Objectives	To provide students with basic understanding of physical and mechanical properties of soil, together with knowledge of basic engineering procedures to identify factors controlling soil behavior and methods to determine soil properties. Students will acquire basic knowledge in engineering design of geotechnical systems
Course Outcomes	Students who successfully complete this course will be able to: 1. Understand the origin of the soil and geological cycle. [7] 2. Apply principles of phase diagram for soil properties and perform basic weight-volume calculations. [1, 6, 7] 3. Understand consistency of soil - Atterberg limits. [6, 7] 4. Understand and use Unified Soil Classification System for soil classification. [6, 7] 5. Understand the basic science of soil compaction. [2, 7] 6. Understand basics principles of flow and soil permeability through porous media including Bernoulli's equation, Darcy's Law, and Hydraulic conductivity. [1, 2, 6, 7]

7. Understand seepage in soil include Laplace equation of continuity. [1, 2, 6, 7]
8. Construct flow nets for water flow calculations. [1, 7]
9. Calculate in situ stress in saturated soil with and without seepage, seepage force, and implement measures to control heave in soil. [1, 2, 6, 7]
10. Understand how stresses are transferred through soils and be able to compute both geostatic and induced stresses due to point, line, and area loads. [1, 6, 7]
11. Estimate the amount of consolidation and settlement and time required for settlement under a given load. [1, 2, 6, 7]
12. Basic knowledge of shear strength principles including the Mohr-Coulomb failure criterion. [6, 7]
13. Utilize computational techniques such as finite element software and finite difference methods to analyze seepage flow. [5, 6, 7]

Lecture Topics

1. Engineering Geology- Background
2. Origin of Soil and Grain Size
3. Phase Relationships
4. Soil classification
5. Soil Compaction
6. Permeability and Seepage
7. In Situ Stresses
8. Stresses in a Soil Mass
9. Compressibility of Soil
10. Shear Strength of Soil
11. Lateral Earth Pressure
12. Bearing Capacity
13. Basic Introduction to Slop Stability and Geosynthetics

Computer Usage Low

Laboratory Experience None

Design Experience Medium

Coordinator Fawad S. Niazi, Ph.D.

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