



CE 452 –Soil Mechanics and Behavior

Code and Name: CE 452 – Soil Mechanics and Behavior

Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:

- Soil Mechanics and Behavior: Principles of Geotechnical Engineering Das, B.M., 8th Edition, Cengage Learning, 2014

Other References:

- Verruijt, A., *Soil Mechanics Delft University of Technology, 2001, 2006* .

Course Description:

Physical and chemical properties of soils, Clay minerals, Soil structure, Shear strength and deformation, Pore pressure parameters, Effective stress analysis, Consolidation and settlement analysis, Introduction to unsaturated soil mechanics.

Pre-requisites: CE351 Geotechnical Engineering, CE352 Geotechnical Engineering Lab

Co-requisites: None

Course Learning Outcomes:

With relation to ABET Student Outcomes (From Fall 2019-SOs: 1-7)

1. Extend depth of understanding in essential soil mechanics theory and geotechnical analysis (1)
2. Analyze and interpret laboratory test data on strength and deformation characteristics of soils (6)
3. Estimate in situ stress in saturated soil with and without seepage, seepage force, and implement measures to control heave in soil. (1)
4. Determine the appropriate type of shear strength of soils to be used for analysis and design of geotechnical structures. (1)
5. Estimate secondary consolidation settlement of soils. (1)

Topics to be covered:

- Introduction to geotechnical engineering: A historical perspective, Background of soil mechanics theories.
- Origin of soils and clay minerals Hydrometer Analysis.
- Pipe Networks: Nodal method, loop method and practical consideration.
- Relationships among unit weight, void ratio, moisture content and specific gravity.
- Plasticity and Atterberg limits, Structure of cohesionless and cohesive soils.
- Stresses in saturated soils without seepage, with upward/downward seepage, Heaving in soil due to flow around sheet piles.
- Effective stress in partially saturated soil, Effective stress in the zone of capillary rise.
- Mohr-Coulomb failure criteria, Laboratory tests for determination of shear strength parameters.
- Sensitivity and thixotropy of clays, Strength anisotropy in clays, Shear strength of unsaturated cohesive soils, Stress paths, Rendulic's plot, Lambe's stress path.
- Compressibility of soil, normally and over-consolidated clays, Compression/swelling indices, Coefficient of compressibility, Constrained modulus.
- Effects of disturbance of void ratio-pressure relationships, Secondary consolidation.

Grading Policy:

The grading for the course is: 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, and projects for the remaining 20% that is modified by the course instructor.

