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University of Tennessee at Chattanooga
College of Engineering and Computer Science
ENCE 361 - Soil Mechanics (3)
Fall 2001

Catalog Description

Geologic overview, soil composition, soil type and structure, index properties, classification, site investigation, subsurface flow, flow nets, drainage, subsurface stresses, settlement, shear strength, and slope stability. Lecture: 2 hours, Laboratory: 1 hour. Prerequisites: 246, 247 with grades of C or better. Engr. 307.

Instructor

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Textbook

McCarthy, D.F., *Essentials of Soil Mechanics*, 6th ed, 2002, Prentice Hall, Columbus, Ohio.

Reference Works¹

NAVFAC DM 7.01, *Soil Mechanics*. Naval Facilities Engineering Command, Alexandria, Virginia, 1986.
EM 1110-2-1906, *Laboratory Soils Testing*. Department of the Army, U.S. Army Corps of Engineers, Washington, DC, 1986.

Course Objectives

Familiarize the student with the basic essentials of soil mechanics and the laboratory tests used to determine fundamental soil properties.

Course Outline

1. Geologic Overview
2. Soil Composition; Weight and Volume Relationships
3. Soil Classification
 - a) Cohesive and Cohesionless Soils
 - b) Granularity and Gradation
 - c) Atterberg Indices (Plasticity Index and Liquid Limit)
 - d) Unified Soil Classification System
 - e) Special Soil Types
 - f) Rock Classification
4. Field Exploration
 - a) Maps and Geological Surveys
 - b) Borings and Test Pits
 - c) SPT Test
 - d) CPT Test
 - e) Menard Pressuremeter
- f) Soil Boring Reports; Preparation and Interpretation
5. Seepage and Drainage
 - a) Subsurface Water Flow
 - b) Darcy's Law
 - c) Capillarity in Soils
 - d) Flow Net Analysis
6. Subsurface Stresses
 - a) Mohr's Circle
 - b) Overburden Pressure and P_o Diagrams
 - c) Boussinesq and Westergaard Stresses
7. Settlement and Volume Expansion
 - a) Immediate Settlement of Soils
 - b) Primary and Secondary Long-Term Settlement/Consolidation of Soils
 - c) Remedies for Consolidation
8. Shear Strength

1 Reference materials can be downloaded from <http://www.vulcanhammer.net/utc/>

- a) Shear Strength of Cohesionless Soils
- b) Undrained and Drained Shear Strength of Cohesive Soils

- 9. Slope Stability
 - a) Types of Slope Movements
 - b) Methods of Stability Analysis

Laboratory Experiments Discussed

- Water Content; Unit Weights
- Liquid Limit; Specific Gravity; Grain Size Analysis
- Compaction Tests
- Permeability Tests
- Consolidation Test
- Drained Direct Shear Test
- Triaxial Compression Test
- Unconfined Compression Test

Evaluation

- Homework: 35%
- Two (2) Tests @ 20% Each: 40%
- Final Examination: 25%

Course Policies

- Due date for homework assignments will be announced when assignment is given. Homework turned in after due date will have 10% deducted from grade for each class period late. Homework turned in after last class session will be given a grade of zero.
- Letter Grading System:
 - 90 – 100: A
 - 80 – 90: B
 - 70 – 80: C
 - 60 – 70: D
 - < 60: F
- Attendance is required with the exception of special arrangements made before class as the only excused absences.
- All homework and tests must be on engineering paper. This comes in light green or buff color and is available with five squares to the inch from the UTC bookstore.
- When applicable, all problems must include a figure. All figures are to be neat and legible. Also when applicable, all problems must include a) Given b) Find c) Solution. On the first page of each problem set or test, in the upper right hand corner write a) Your Name, b) Course Number and c) Problem Set or Test Number. *Any problem set or test that does not follow these rules or is not neat will receive reduced credit.*
- Each time you use an equation, write down what it is: don't just put a bunch of numbers on the page and expect anyone to know what you did. This too will result in reduced credit.
- You are encouraged to work homework with someone but your turned in work must be your own work.
- You are studying now so that you may enter and practice the engineering profession later. The engineering profession is highly regarded by the public because those who practice it do so with ethical and social consciousness. The same is expected of students in this course. Any direct copying of homework, tests or exams will be considered a violation of the honor code and a course grade of "F" will be given.

Disabilities

If you are a student with a disability and think that you might need special assistance for a special accommodation in this class or any other class, call the Office for Students with Disabilities/College Access Program at 755-4006 or come by this office, 110 Frist Hall. Examples of disabilities might include blindness/low vision, communication disorders, deafness/hearing impairments, emotional/psychological disabilities, and other health impairments. This list is not exhaustive.