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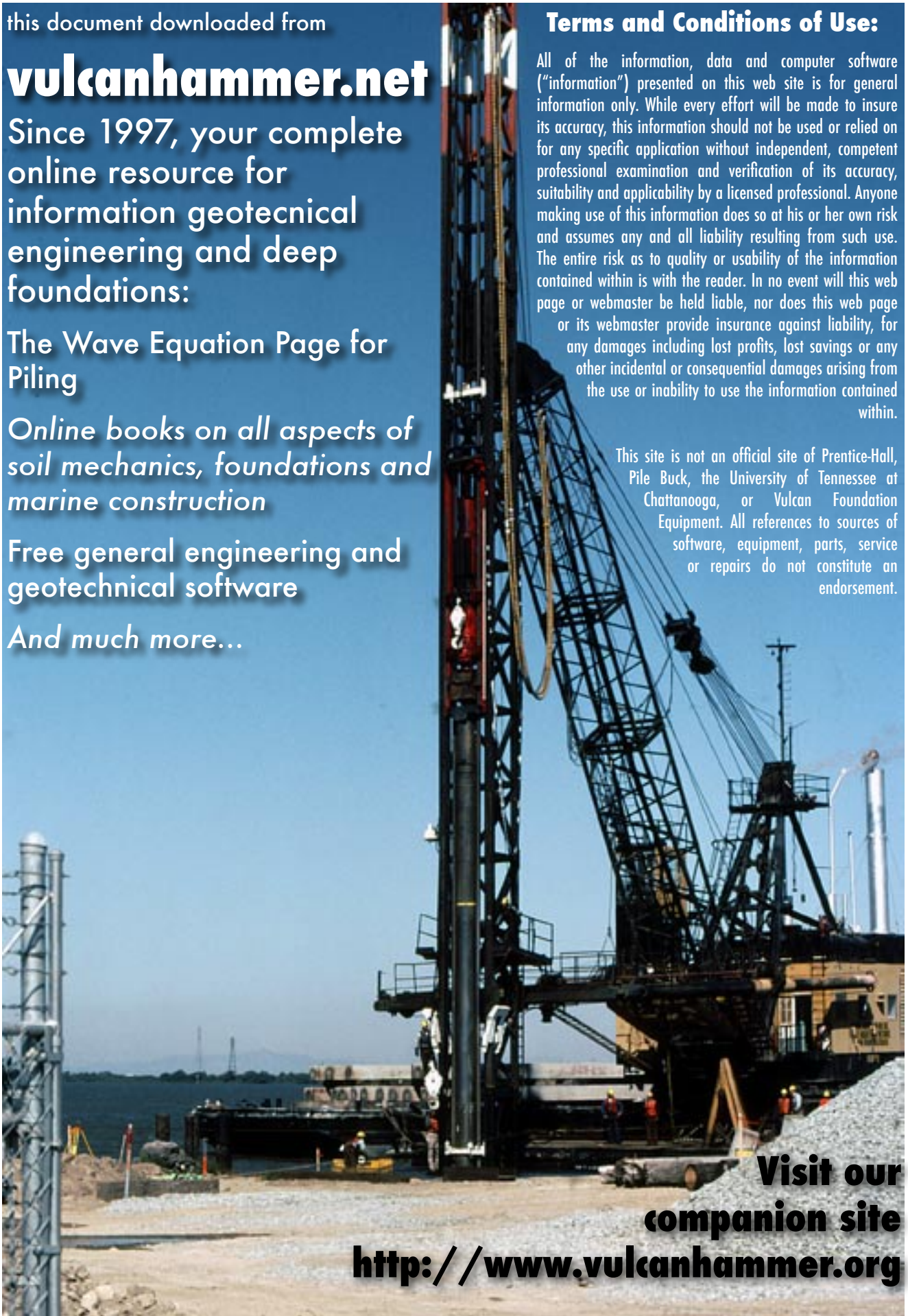
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University of Tennessee at Chattanooga

College of Engineering and Computer Science

ENCE 361 - Soil Mechanics (3)

Spring 2010

Section 001: M-W 0800-0915, EMCS 402

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

Don C. Warrington, P.E., M.S.

Office: EMCS 430E

Hours posted on Blackboard

Email Don-Warrington@utc.edu

Website <http://www.vulcanhammer.net/utc/ence361/s2010/>

Textbooks¹

1. Das, Braja M. *Principles of Geotechnical Engineering*. Seventh Edition. Stamford, CT: Cengage Learning, 2009
2. EM 1110-2-1906, *Laboratory Soils Testing*. Department of the Army, U.S. Army Corps of Engineers, Washington, DC, 1986.

Reference Works

NAVFAC DM 7.01, *Soil Mechanics*. Naval Facilities Engineering Command, Alexandria, Virginia, 1986.

Sabatini, P.J., Bachus, R.C., Mayne, P.W., Schneider, J.A., and Zettler, T.E. *Evaluation of Soil and Rock Properties*. FHWA Geotechnical Engineering Circular #5. FHWA-IF-02-034. Washington, DC: Federal Highway Administration.

U.S. Army. *Military Soils Engineering*. Field Manual FM 5-410, Change 1. Washington, DC: U.S. Army, 1992.

Course Objectives (numbers in parentheses indicate relationship to civil engineering program outcomes)

At the completion of the course, students will have demonstrated the ability to:

- ✓ Perform phase calculations on soil/water/air mixtures. (2, 3, 6)
- ✓ Determine soil classification using the Unified System. (2, 3, 6)
- ✓ Determine groundwater flow through a homogeneous, isotropic soil. (2, 3)
- ✓ Determine effective stress of a soil assuming hydrostatic conditions. (2, 3)
- ✓ Predict consolidation settlement in a cohesive soil. (2, 3)
- ✓ Determine Mohr-Coulomb failure envelope from triaxial test results.(2, 3, 6)

¹ Item (1) is to be purchased. Items (2) and the Reference Works can be downloaded from <http://www.vulcanhammer.net/utc/>, or a hard copy can be obtained as well at the same place.

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. Soil Improvement and Compaction
6. Seepage and Drainage
 - a) Subsurface Water Flow
 - b) Darcy's Law
 - c) Capillarity in Soils
 - d) Flow Net Analysis
7. Subsurface Stresses
 - a) Mohr's Circle
 - b) Overburden Pressure and P_o Diagrams
 - c) Boussinesq and Westergaard Stresses
8. Compressibility and Settlement
 - a) Primary and Secondary Long-Term Settlement/ Consolidation of Soils
 - b) Remedies for Consolidation
9. Shear Strength
 - a) Shear Strength of Cohesionless Soils
 - b) Undrained and Drained Shear Strength of Cohesive Soils
10. Slope Stability
 - a) Types of Slope Movements
 - b) Methods of Stability Analysis

Laboratory Experiments (Will Pick Six)

- Water Content; Unit Weights
- Atterberg Limits (Liquid Limit, Plastic Limit)
- Specific Gravity
- Grain Size Analysis (Sieve)
- Grain Size Analysis (Hydrometer)
- Compaction Tests
- Permeability Tests
- Consolidation Test
- Drained Direct Shear Test
- Triaxial Compression Test
- Unconfined Compression Test

Evaluation

- ➔ Homework: Seven (7) assignments @ 4% each = 28%
- ➔ One (1) Mid-Term Examination: 14%
- ➔ Three (3) unannounced quizzes @ 4% each: 12%
- ➔ Six (6) Laboratory Reports @ 5% each: 30%
- ➔ Final Examination: 16%

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:

→ 70 – 80: C
→ 90 – 100: A
→ 80 – 90: B
→ 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 required to keep and assemble a three-ring (or other suitable binding) notebook with the following divisions in it:
 - Homework
 - Quizzes
 - Tests
 - Laboratory Experiment Reports
 - Class Notes (Optional)

You will turn this notebook in at the final exam. It will be inspected and returned to you.
- 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.