

Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 3040 – Geotechnical Engineering Laboratory
(CEE 3040 lab or CEE 3120 lab is Required)
Fall Semester 2007, Spring Semester 2008

2007 Catalog Data: CEE 3040. Geotechnical Engineering Lab. Lab 2. Credit 1.
Measurement of basic engineering properties of soils. Prerequisite: CEE 3030

Textbook: Braja M. Das, *Soil Mechanics Laboratory Manual*, Fifth Edition, 1997.

Reference: ASTM Annual Book of Standards

Coordinator: Dr. D. A. Badoe, Associate Professor of Civil Engineering

Goal: The goal of CEE 3040 “Geotechnical Engineering Lab” is to acquaint students with basic soil tests.

Course learning objectives:

1. The student will gain hands-on experience in conducting soil laboratory tests to determine soil parameters needed for geotechnical engineering design, and to communicate this information with others.

Course measurable outcomes:

Students will be expected to:

1. conduct and explain liquid and plastic limit tests on soils;
2. explain the hydrometer tests in general terms;
3. classify soils by the Unified and AASHTO soil classification systems;
4. solve basic weight-volume problems;
5. analyze moisture-density relations for soils and determine specification compliance;
6. analyze one-dimensional consolidation data;
7. calculate soil strength parameters from basic strength tests such as unconfined compression, drained direct shear, and California Bearing Ratio;
8. analyze constant head permeability data;
9. write basic reports on soil property evaluations; and
10. know where to obtain information on standardized procedures for conducting basic soil tests.

Topics covered: (One Lab per week, 2 hours each)

1. Hydrometer Test (2 classes)
2. Atterberg Limits Tests (1 class)
3. Soil Classification and Weight-Volume Relationships (1 class)
4. Moisture-Density Relations (1 class)
5. Soil Compaction – Standard Proctor Test (1 class)
6. Field Densities – Sand Cone, and Drive Tube Tests (1 class)
7. One Dimensional Consolidation Test (2 classes)
8. Unconfined Compression Test (1 class)
9. Drained Direct Shear Test (1 class)
10. California Bearing Ratio Test (1 class)
11. Constant Head Permeability Test (1 class)
12. Test (1 class)

Contribution of the course to meeting professional component:

This course is a part of engineering topics of the curriculum, and it is 100% laboratory.

ABET category content as estimated by faculty member who prepared this course description:

Engineering Science: 1.0 credit or 100%

Engineering Design: 0 credits or 0%

Relation of course to program outcomes:

- Outcome 1: The graduates will have a broad understanding of relevant principles of mathematics, science, and engineering.
- Outcome 2: The graduates will have a general comprehension of four technical areas appropriate to civil engineering.
- Outcome 5: The graduates will have effective communication skills.
- Outcome 7: The graduates will have an understanding of experimental processes.

Relation of course to ABET Criteria:

<u>General Criteria</u>	Bloom's Level of Achievement
(3a) Knowledge of math, science, engineering	3
(3b) Design, conduct experiments; analyze and interpret data	4
(3f) Professional and ethical responsibility	2
(3g) Effective Communication	4
(3k) Techniques, skills, modern tools for engineering practice	3

<u>Program Criteria</u>	Bloom's Level of Achievement
1. Apply knowledge of math and sciences	3
2. Conduct civil engineering experiments and analyze and interpret the resulting data	4

Computer usage:

1. Use of word processor and spreadsheet software

Laboratory projects:

1. Laboratory projects required

Prepared by: D. A. Badoe

Date: August 2007