

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE  
MASTER SYLLABUS

**SOIL MECHANICS W/LAB  
CET 2112**

**Class Hours: 3.0**

**Credit Hours: 4.0**

**Laboratory Hours: 3.0**

**Date Revised: Spring  
02**

**Catalog Course Description:**

Basic soil mechanics and foundation design characteristics. Topics include properties and characteristics of soils; permeability, seepage and flow nets; settlement, consolidation, compaction, and design of footings.

**Entry Level Standards:**

Students should be capable of critical and analytical thinking and should have sufficient mathematical skills to formulate and solve algebraic equations. They should have the ability to perform laboratory tests, record data draw conclusions and prepare reports that meet prescribed technical and grammatical standards.

**Prerequisites:**

MATH 1730 or 1731

**Textbook(s) and Other Reference Materials Basic to the Course:**

Textbook:

Shroeder, W. L. and Dickenson, S. E., *Soils in Construction*, Prentice Hall, Englewood Cliffs, New Jersey, 1996

Reference:

*American Society for Testing and Materials*  
Laboratory Instructions  
Instructor Handout

**I. Week/Unit/Topic Basis:**

<b>Week</b>	<b>Topic</b>
1	Lecture: Physical Character of Soil Lab: Excel Spreadsheets
2	Lecture: Specific Gravity and Unit Weight Lab: Excel Spreadsheets
3	Lecture: Soil Index Properties Lab: Introduction to the Soils Laboratory
4	Lecture: Soil Index Properties; Exam I Lab: Water Content

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| 5  | Lecture: Basic Tests on Soil<br>Lab: Specific Gravity                              |
| 6  | Lecture: Soil Classification<br>Lab: Gradation Analysis-Mechanical                 |
| 7  | Lecture: Soil and Water Relations<br>Lab: Gradation analysisBHydrometer            |
| 8  | Lecture: Soil and Water Relations; Exam II<br>Lab: Atterberg Limits                |
| 9  | Lecture: Soil and Water Relations<br>Lab: Compaction                               |
| 10 | Lecture: Strength Concepts<br>Lab: Field Trip to a Soils Laboratory                |
| 11 | Lecture: Strength Concepts<br>Lab: Permeability                                    |
| 12 | Lecture: Settlement and Compressibility<br>Lab: Direct Shear-Granular Soil         |
| 13 | Lecture: Design of Footings; Exam III<br>Lab: Direct Shear-Cohesive Soil           |
| 14 | Lecture: Soil Contracts in Construction<br>Lab: Compressive Strength-Cohesive Soil |
| 15 | Lecture: Interpretation of Soil Reports<br>Lab: Field Trip to a Construction Site  |
| 16 | Exam IV  |

**II. Course Objectives\*:**

- A. Understand the physical condition of a soil mass and the associated descriptive terms. I, II & VI
- B. Perform the basic tests on soils using standard procedures and prepare a professional report. I, II, III, IV, V & VI
- C. Determine soil classifications, names and descriptive adjectives according to standard classification procedures. I, II & VI
- D. Understand the stresses created by water, the effect of buoyancy and the movement of water through soil. I, II, & VI
- E. Understand the concept of strength in a soil mass. I, II, & VI
- F. Understand settlement and compressibility of a soil mass. I, II, & VI

\*Roman numerals after course objectives reference goals of the CET program.

**III. Instructional Processes\*:**

Students will:

1. Participate in classroom discussions which challenge the students' ability to think creatively. *Communication Outcome, Problem Solving and Decision Making Outcome, Active Learning Strategy*
2. Visit commercial soil laboratories and construction sites and hear guest lecturers from the engineering community to help in the transition from the classroom and laboratory to work. *Transitional Strategy, Communication Outcome, Active Learning Strategy*
3. Work in teams to conduct laboratory tests and solve special problems to foster interpersonal skills of teamwork . Frequently this leads to development and refinement of leadership skills and the ability to express ones' thoughts and ideas and seek, through negotiation, consensus of the team. *Communication Outcome, Personal Development Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Informational Literacy Outcome, Active Learning Strategy*
4. Use computers to process information obtained through laboratory tests and problem assignments to enhance information literacy skills. Spreadsheets are used to record laboratory data, to perform data reduction and to prepare logical tabular and graphical presentations of the laboratory results. Word processing software is used to prepare reports and the Internet is used for special assignments. *Technological Literacy Outcome, Numerical Literacy Outcome, Informational Literacy Outcome*
5. Prepare professional level reports describing standard soil laboratory tests requiring mathematical analysis as well as written communication to advance the basic skills of writing and mathematics. *Communication Outcome, Problem Solving and Decision Making Outcome, Informational Literacy Outcome, Active Learning Strategy*
6. Discuss the importance of such personal qualities as ethics and personal responsibility in school and in the workplace. *Personal Development Outcome*

\*Strategies and outcomes listed after instructional processes reference Pellissippi State' s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

#### **IV. Expectations for Student Performance\*:**

Upon successful completion of this course, the student should be able to:

1. Understand and use the terminology. A,B,C,D,E&F
2. Determine the different phases of a soil. A
3. Determine the void ratio and porosity of a dry two-phase soil. A
4. Determine the significance of unit weight, specific gravity and water content. A,B
5. Determine the significance of the degree of saturation of a soil mass. A,B
6. Describe the Interrelationship of soil mass properties. A
7. Determine the importance of Grain Size Distribution. A, B
8. Determine the importance of Liquid, Plastic and Shrinkage Limits. B
9. Determine the importance of Compactibility. B

10. Determine the importance of Permeability. B
11. Determine the importance of Direct Shear. B
12. Determine the engineering classification of soil by the major classification systems. C
13. Calculate the total stress, effective stress and hydraulic stress. D
14. Calculate the movement of water through soil. D
15. Describe the use of flow nets to estimate seepage, uplift pressure on dams and piping and creep ratios. D
16. Calculate the stresses on a soil mass using Mohr's Circle. E
17. Apply Coulomb's Law. E
18. Discuss the performance of strength tests: compression, penetration and direct shear. B,E
19. Calculate the settlement due to loads on cohesive and cohesionless soils. F
20. Determine the time-settlement relationships for a cohesive soil. F
21. Prepare reports to meet professional standards. G

\*Letters after performance expectations reference the course objectives listed above.

## **V. Evaluation:**

### A. Testing Procedures:

Four examinations will be given covering the lecture materials. These exams will be given as shown on the schedule above. The examinations may consist of problems and essay, short answer or multiple choice questions. One examination may be made up if the student has a valid excuse for missing the examination. The examination must be made up within one week.

The four examinations will account for 60 percent of the final grade.

### B. Laboratory Expectations:

A number of laboratory tests are scheduled and at one or more field trips will be scheduled. A laboratory journal will be kept by each student and reports prepared in accordance with the procedure described in Appendix A for all laboratory tests. The student will be graded on laboratory technique, the journal and the reports. Reports will be graded for technical content but they must meet acceptable grammar standards or they will be returned to the student to be redone. It is suggested that the student consult with an English tutor in the Learning Center regarding the preparation of reports.

A short quiz will be given at the beginning of each laboratory period on the procedure for the test being conducted that day. The score on the quiz will be added to the grade of the report. The student must complete all laboratory assignments and submit an acceptable report to receive a passing grade in the course.

The laboratory grade will account for 30 percent of the final grade.

### C. Field Work:

#### Quizzes and Homework:

Unscheduled short quizzes may be given covering the previous class lecture or the assignment

for the current day. Quizzes may not be made up.  
Homework will be assigned regularly.  
Quizzes and homework will account for 10 percent of the final grade.

**D. Other Evaluation Methods:**

N/A

**E. Grading Scale:**

90-100	A
86-89	B+
80-85	B
76-79	C+
70-75	C
60-69	D
0-59	F

**VI. Policies:**

**Attendance Policy:**

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course (Pellissippi State Catalog). Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.