

PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

**CONSTRUCTION MATERIALS W/LAB
CET 1022**

Class Hours: 3:0

Credit Hours: 4:0

Laboratory Hours: 3:0

Date Revised: Fall 2012

Catalog Course Description:

This is an introductory course in the basic properties, testing and inspection of construction materials and the methods of production of these materials. Topics include an introduction to basic concepts of strength of materials and properties of construction materials such as aggregates, asphalt, steel, and wood; their proper application; performance of standard tests on construction materials and the preparation of proper technical reports on test results. Word processing and spreadsheet software are used to prepare reports that include text, tables, data reduction and graphs. Spreadsheet templates are developed for use in data reduction.

Entry Level Standards:

Students should be capable of critical and analytical thinking and should have sufficient mathematical skills to formulate and solve simple 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:

None

Corequisites:

None

Textbook(s) and Other Course Materials:

Textbook:

Basic Construction Materials; Theodore W. Marotta; Pearson, Prentice Hall newest edition.

References:

American Society for Testing and Materials
Design and Control of Concrete Mixtures, Portland Cement Association
Laboratory Instructions
Instructor Handout

I. Week/Unit/Topic Basis:

Week Topic

- | | |
|----|---|
| 1 | Lecture: Introduction to Construction Materials , Properties of Materials
Lab: Presentation of data using tables and graphs. “Excel Spreadsheet |
| 2 | Lecture: Properties of Materials
Lab: Report Format |
| 3 | Lecture: Aggregates
Lab: Total Moisture Content of Aggregate “ASTM C 566” |
| 4 | Lecture: Aggregates
Lab: Sieve Analysis of Fine and Coarse Aggregate “ASTM C 136” |
| 5 | Lecture: Aggregates
Lab: Unit Weight, Specific Gravity & Absorption of Coarse Aggregate “ASTM C 29 & C 127” |
| 6 | Lecture: Portland Cement Concrete; Exam I
Lab: Concrete Mix Design; ACI 211 |
| 7 | Lecture: Portland Cement Concrete
Lab: Concrete Trial Mix; Slump ASTM C143; Unit Weight ASTM C 138;
Air Content ASTM C 231; Temperature ASTM C 1064 of freshly mixed concrete |
| 8 | Lecture: Portland Cement Concrete
Lab: Concrete Final Mix-Cast samples |
| 9 | Lecture: Portland Cement Concrete
Lab: 7- Day Compressive Strength of cylindrical specimens; ASTM C 39
Lab: Water Content of Soil ASTM D 2216 |
| 10 | Lecture: Iron and Steel; Exam II
Lab: 14- Day Compressive Strength of cylindrical specimens; ASTM C 39
Lab: Standard Test Method for Specific Gravity of Soils; ASTM D 854 |
| 11 | Lecture: Iron and Steel
Lab: 21- Day Compressive Strength of cylindrical specimens; ASTM C 39 |
| 12 | Lecture: Asphalt
Lab: 28- Day Compressive Strength of cylindrical specimens and Flexural
Strength of concrete beam with Third Point Loading ; ASTM C 39 & ASTM C78 |
| 13 | Lecture: Soil Compaction
Lab: Soil Compaction; ASTM D 698 “ Standard Proctor compaction test” |
| 14 | Lecture: Wood / Masonry
Lab: Concrete design mix ; PowerPoint Presentation |
| 15 | Final Exam Period |

II. Engineering Technology General Outcomes (Educational objectives)

- | | |
|----|---|
| I | Apply basic engineering theories and concepts creatively to analyze and solve technical problems |
| II | Utilize with a high degree of knowledge and skill equipment, instruments, software, and technical reference materials currently used in industry. |

- III Communicate effectively using developed writing, speaking, and graphics skills.
- IV Assimilate and practice the concepts and principles of working in a team environment.
- V Obtain employment within the discipline or matriculate to a four year program in engineering or industrial technology

III. Engineering Technology Concentration Competencies*

Students will:

- A Apply the knowledge, techniques, skills, and modern tools for the concentration of study to specifically defined engineering technology activities
- B Demonstrate the knowledge of mathematics, science, engineering and technology to engineering technology problems using developed practical knowledge
- C Conduct and report the results of standard tests and measurements, and conduct, analyze and interpret experiment or project results
- D Function effectively as a member of a technical team
- E Identify, analyze and solve specifically defined engineering technology-based problems
- F Employ Written, oral and visual communication in a technical environment

- At the program level all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

IV. Course Goals*:

Pellissippi State Career Program goals

The course will

- 1 Expand student understanding of the basic concepts of strength of materials. (A, B,C, E)
- 2. Enhance the student's knowledge of selected construction materials. (A, B, C)
- 3. Guide students to understand applications for selected construction materials. (A,B)
- 4. Allow students to perform calculations to determine size and quantities of materials required for applications. (A,B,E)
- 5. Enhance the student's knowledge in performing tests on selected construction materials according to ASTM procedures or other accepted references. (A,B,C,D,E,F)
- 6. Improve the effective use of the English language essential to success in school and in the world by way of learning to read and to write technical reports. (C,E,F)

*Capital letters after course goals reference the competencies of the Engineering Technology concentrations listed above.

V. Expected Student Learning Outcomes*:

Students will be able to:

- a. Explain the basic properties of materials: thermal expansion and conductivity, stress and strain, elastic and plastic properties, modulus of elasticity, and specific gravity. 1 & 2
- b. Explain the basic production processes for selected construction materials. 2 & 3
- c. Explain the use and properties of aggregates in construction. 2,3, & 4
- d. Explain the standard laboratory tests for aggregates. 2, 5, & 6
- e. Understand the manufacture, chemical composition and physical properties of Portland cement. 2
- f. Understand the types and applications of Portland cement. 3
- g. Understand proportioning concrete ingredients to meet design specifications. 4
- h. Understand standard tests on concrete. 2, 5, & 6
- i. Understand the manufacture, and physical properties of asphalt. 2
- j. Name the tests conducted on asphalt. 2
- k. Discuss the types of road surfaces and preparation for paving with asphalt. 4
- l. Discuss the basic characteristics of wood and its application in construction. 2 & 3
- m. Discuss the different types of structural wood products. 2 & 3
- n. Discuss the properties and use of Masonry in construction. 2 & 3
- o. Select the appropriate ASTM procedure or other acceptable procedures to conduct material tests. 5
- p. Prepare written technical reports describing the test procedure, results and conclusions of a laboratory test. 6

* Numbers after Expected Student Learning Outcomes reference the course goals listed above.

VI. Evaluation:

A. Testing Procedures: 50 – 60 % of grade

Three examinations will be given covering the lecture materials. The approximate dates of are shown above. The examinations may consist of problems and essay, short answer or multiple choice questions. It is the student's responsibility to know when an exam is scheduled.

B. Laboratory Expectations: 40 – 50 % of grade

Laboratory Reports 20 - 30 %:

A number of laboratory tests are scheduled. A laboratory journal will be kept by each student and reports prepared for all laboratory tests in accordance with the procedure described in the Laboratory Instructions. The student will be graded on laboratory technique, the journal and the reports. Reports will be graded for technical content and grammar standards. Reports are due one week after the test is done. Late reports will be penalized 10 points for each week they are late. The student must complete all laboratory assignments and submit an acceptable report to receive a passing grade in the course

Homework: 10 -15 %

Homework assignments, participation in classroom and laboratory discussions will count a maximum of 10 - 15 percent of the final grade.

Semester Project / PowerPoint Presentation 5 – 10 %:

An oral presentation and a written report will be required from each student and / or group. The PowerPoint presentation and written report will account for 5 - 10 percent of the final grade

C. Field Work: ____% of grade

None

D. Other Evaluation Methods: ____% of grade

None.

E. Grading Scale:

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

VII. Policies:

A. Attendance Policy:

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of Academic Affairs.

B. Academic Dishonesty:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

C. Accommodations for disabilities:

Students who need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127, 132, 134, 135, 131 or by phone: 539-7153 or TTY 694-6429. More information is available at <http://www.pstcc.edu/sswd/>.

D. Other Policies:

1. Use of Equipment:

Any act of misuse, vandalism, malicious or unwarranted damage or destruction, defacing, disfiguring, or unauthorized use of property/equipment belonging to Pellissippi State is subject to disciplinary sanction.