REINFORCED CONCRETE DESIGN
CET 2420

Class Hours: 3.0  Credit Hours: 3.0
Laboratory Hours: 0.0  Revised: Fall 2004

Catalog Course Description:
Design of reinforced concrete structures, fundamentals of design of beams, columns, floor systems, footing and retaining walls.

Entry Level Standards:
Students entering this course should have good note-taking and study skills. Good math skills are a must.

Prerequisite:
MET 1040

Textbook(s) and Other Course Materials:

Text:  
Simplified Reinforced Concrete, Nawy, Prentice Hall

Reference:
Simplified Design of Reinforced Concrete, 4th edition, Harry Parker, John Wiley and Sons, Inc.
Reinforced Concrete Fundamentals, 3rd edition, Phil M. Ferguson, John Wiley and Sons, Inc

Other:
- Paper
- Pencil

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Concrete as a Material</td>
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<tr>
<td>2</td>
<td>Placing, Curing and Testing of Concrete</td>
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<tr>
<td>3</td>
<td>Flexural Analysis and Design Principles</td>
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<tr>
<td>4</td>
<td>Bonds and Anchorage of Steel Reinforcement</td>
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<td></td>
<td>EXAM I</td>
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<tr>
<td>5</td>
<td>Design of Rectangular Beams</td>
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<td>6</td>
<td>Design of Rectangular Beams</td>
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<td>7</td>
<td>Design of T Beams</td>
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<tr>
<td>8</td>
<td>Design of T Beams</td>
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II. Course Objectives*:

A. Determine the physical and mechanical properties of reinforced concrete. I & II
B. Ascertain the ACI design code limitations. I & II
C. Apply ACI code limits to beam design. I, II & III
D. Apply ACI code limits to column design. I, II & III
E. Apply ACI code limits on reinforcing steel design. I, II & III
F. Determine foundation loads and design footings. I, II & III

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

III. Instructional Processes*:

Students will:

1. Actively listen to class lectures and participate in class activities that develop and reinforce comprehension of the theories, concepts, principles and applications of distance measurement using surveying instruments. Communication Outcome, Problem Solving & Decision Making Outcome, Active Learning Strategies

2. Work individually and in teams to complete class assignments. Communication Outcome, Problem Solving & Decision Making Outcome, Information Literacy Outcome, Active Learning Strategies

3. Use WordPerfect/Word or other appropriate software to generate written homework assignments. Communication Outcome, Problem Solving & Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategies

4. Interpret and use the ACI design Code. Communication Outcome, Technological Literacy Outcome, Active Learning Strategies

*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. Explain the basic hypothesis of concrete. A
2. Describe how cement is manufactured. A
3. Explain the importance of the water/cement ratio. A
4. Identify admixtures and their importance. A
5. Standardized tests on both fresh and hardened concrete. A
6. Explain the nature of bending stresses and the nature of beam failure. B
7. Apply ACI load factors correctly in design calculations. B
8. Design singly reinforced beams in flexure. B,C
9. Design a one-way slab. C
10. Design a doubly reinforced beam in flexure. C
11. Design T and L beams. C
12. Properly design reinforcing steel for bond and anchorage. E
13. Design beams for deflection and cracking. C
14. Explain how column loading and column type affect design considerations. D
15. Design rectangular columns. D
16. Design round columns. D
17. Identify the types of footings. F
18. Explain the shear and flexural behavior of footings. F
19. Design footings. F
20. Design retaining walls. F

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

V. Evaluation:

A. Testing Procedures:

   Four examinations are scheduled. They will be True/False, Multiple Choice, Matching, and Problem Solving. Students normally have 1 week to complete the exam. Examinations will normally be given as scheduled. Should a student have a planned vacation, operation, etc. occur during a scheduled exam, every effort should be made to take the exam prior to the scheduled absence. When a student misses an exam due to illness, he must contact the instructor immediately upon return and make-up the exam within one week.

B. Laboratory Expectations:

   **Quizzes:**
   Quizzes may be given by the instructor. Most quizzes will be unscheduled and randomly given. They cover the previous sessions material or the reading assignment for that day. There is no make-up or extra credit given for quizzes missed.

   **Written Assignments:**
   A minimum of two written reports will be required. Topics will be provided by the instructor. Students will also be required to hand in appropriate homework at the instructor's discretion. All written assignments must be handed in on 8 1/2 x 11 engineering notepad paper, typing paper, or forms provided by your instructor.

   All written assignments will be assessed a 10% penalty for each school day it is date.
All student work submitted for evaluation may be retained by the instructor.

C. Field Work:

N/A

D. Other Evaluation Methods:

A subjective evaluation based on attendance, classroom participation and attitude may be included (10%).

E. Grading Scale:

Final grades will be computed from the grades obtained on homework, quizzes and examinations as follows:

Quizzes & Homework = 20% - 30%
Examinations = 70% - 80%

Grades are based on the following:
91 - 100    A
86 - 90    B+
81 - 85    B
76 - 80    C+
71 - 75    C
66 - 70    D+
60 - 65    D
Below 60 F

VI. Policies:

A. 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. It is the student's responsibility to attend every scheduled class activity on time. Students are responsible to get assignments missed and to make-up any work missed during an absence.

B. Academic and Classroom Misconduct:

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. In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or zero for the assignment or (2) an F for the course.

C. Accommodations for disabilities:

If you need accommodation because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Privately after class or in the instructor's office. To request accommodations students must register with Services for Students with Disabilities: Goins 127 or 131, Phone: (865) 539-7153 or (865) 694-6751 Voice/TDD.