

PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

REINFORCED CONCRETE DESIGN
CET 2420

Class Hours: 3.0

Credit Hours: 3.0

Laboratory Hours: 0.0

Revised: Fall 2013

Catalog Course Description:

Design of reinforced concrete structures, including beams, columns, floor systems, footings and retaining walls.

Entry Level Standards:

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

Prerequisites:

MET 1040

Textbook(s) and Other Course Materials:

Text:

Simplified Reinforced Concrete, Nawy, Prentice Hall

Reference:

ACI 318-77 Building Code Requirements for Reinforced Concrete With Commentary, Notes on ACI 318-77, Portland Cement Association.

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:

Week	Topic
1	Concrete as a Material
2	Placing, Curing and Testing of Concrete
3	Flexural Analysis and Design Principles
4	Bonds and Anchorage of Steel Reinforcement EXAM I
5	Design of Rectangular Beams

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| 6 | Design of Rectangular Beams |
| 7 | Design of T Beams |
| 8 | Design of T Beams |
| 9 | Design of Beams in Torsion
EXAM II |
| 10 | Design of One-way Slabs |
| 11 | Design of Retaining Walls
EXAM III |
| 12 | Analysis and Design of Columns |
| 13 | Analysis and Design of Columns |
| 14 | Design of Footings |
| 15 | FINAL EXAM |

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*:

The course will

1. Build the skills to determine the physical and mechanical properties of reinforced concrete. A & B
2. Develop an awareness of the ACI design code limitations. A & B
3. Build the skills to apply ACI code limits to beam design. A, B & C
4. Build the skills to apply ACI code limits to column design. A, B & C
5. Build the skills to apply ACI code limits on reinforcing steel design. A, B & C
6. Expand the student's understanding of how to determine foundation loads and design footings. A, B & C

*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 hypothesis of concrete. 1
- b. Describe how cement is manufactured. 1
- c. Explain the importance of the water/cement ratio. 1
- d. Identify admixtures and their importance. 1
- e. Standardized tests on both fresh and hardened concrete. 1
- f. Explain the nature of bending stresses and the nature of beam failure. 2
- g. Apply ACI load factors correctly in design calculations. 2
- h. Design singly reinforced beams in flexure. 2 & 3
- i. Design a one-way slab. 3
- j. Design a doubly reinforced beam in flexure. 3
- k. Design T and L beams. 3
- l. Properly design reinforcing steel for bond and anchorage. 5
- m. Design beams for deflection and cracking. 3
- n. Explain how column loading and column type affect design considerations. 4
- o. Design rectangular columns. 4

- p. Design round columns. 4
- q. Identify the types of footings. 6
- r. Explain the shear and flexural behavior of footings. 6
- s. Design footings. 6
- t. Design retaining walls. 6

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

VI. Evaluation:

A. Testing Procedures: 70 – 80% of grade

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:

n/a

C. Field Work:

n/a

D. Other Evaluation Methods: 20 – 30% of grade

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 late.

All student work submitted for evaluation may be retained by the instructor.

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

E. Grading Scale:

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 that 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 sending email to disabilityservices@pstcc.edu, or visiting Goins 127, 132, 134, 135, 131. More information is available at <http://www.pstcc.edu/sswd/>.

D. Other Policies:

Safety and Equipment Abuse:

Repeated safety violations will result in a reduction of final grade, at the instructor's discretion. Flagrant violations which result in equipment damage or personal injury could result in automatic failure of the course