

Tennessee Technological University  
Department of Civil & Environmental Engineering  
CEE 4320 – Reinforced Concrete Design  
Required  
Fall Semester 2007, Spring Semester 2008

- 2007 Catalog Data: CEE 4320: Reinforced Concrete Design. Lecture 2. Recitation 2. Credit 3. Design of members and structures in concrete. Design of beams, slabs, columns, and footings. Prerequisite: CEE 3320.
- Textbook: Jack C. McCormac, Wiley, *Design of Reinforced Concrete*, Seventh edition, 2006.
- Reference: *Building Code Requirements for Reinforced Concrete (ACI 318R-05)*, American Concrete Institute Publisher, 2005.
- Coordinator: E.P. Ryan, Associate Professor of Civil Engineering
- Goal: The goal of CEE 4320 “Reinforced Concrete Design” is to produce students who have a basic understanding of the behavior, analysis, design, and construction of reinforced concrete structural members.

Course learning objectives:

1. The student is to develop an understanding of the behavior of reinforced structural elements under loads.
2. The student is to learn the fundamental principles necessary for the analysis and design of reinforced concrete structural members.
3. The student is to develop the ability to apply basic design procedures to reinforced concrete structural members in a manner which ensures the safety and utility of the structure.

Course measurable outcomes:

Students will be expected to:

1. understand basic material properties of reinforced concrete and the behavior of reinforced concrete members;
2. understand the ultimate strength method used in reinforced concrete design;
3. understand the fundamental principles of the design and analysis of reinforced concrete structural members subjected to axial force, bending moment, shear or combinations thereof;
4. analyze and design typical reinforced concrete beams, columns, and footings using American Concrete Institute 318 Building Codes; and
5. develop an appreciation of issues involved in reinforced concrete construction.

Topics covered: (Two lecture classes per week, 55 minutes each, One recitation class per week, 110 minutes)

1. Material properties of reinforced concrete (1 class)
2. Design of rectangular beams and one-way slabs with tensile reinforcements (5 classes)
3. Design of T-Beams (2 classes)
4. Design of beams with tensile and compressive reinforcement (2 classes)
5. Design of reinforcing steel cut-off points (2 classes)
6. Design of reinforcing steel development length (2 classes)
7. Design of diagonal tension reinforcement-stirrups (1 classes)
8. Column design (7 classes)
9. Footing design (6 classes)

Contribution of the course to meeting professional component:

This course is a part of the engineering topics of the curriculum with a significant design content. It also includes recitation sessions.

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

Engineering Science: 0 credits or 0%  
Engineering Design: 3 credits or 100%

Relation of course to program outcomes:

- Outcome 1: The graduates will have a broad understanding of the 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 4: The graduates will be capable of design activities and have the ability to identify, formulate, and solve civil engineering problems.  
Outcome 8: The graduates will have the ability to use techniques, skills, and modern engineering tools needed for engineering practice.

Relation of course to ABET Criteria:

<u>General Criteria</u>	Bloom's Level of Achievement
(3a) Knowledge of math, science, engineering	3
(3c) Design a system, component or process	5
(3e) Identify, formulate, and solve engineering problems	5
(3g) Effective communication	2
(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. Design a system, component, or process in more than one civil engineering context	5
3. Apply knowledge of four technical areas appropriate to civil engineering	3

Computer usage:

1. Homework assignments in topics 2, 3, and 4 using stored programs.

Recitations:

1. Problem solving sessions corresponding to assigned design problems (11 recitations)
2. Examinations (3 recitations)

Laboratory projects: None

Prepared by: E.P. Ryan

Date: September 2007