

Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 4360/5360 – Advanced Topics in Structural Concrete Design
Elective
Fall Semester 2007, Spring Semester 2008

- 2007 Catalog Data: CEE 4360(5360): Advanced Topics in Structural Concrete Design. Lec. 3. Credit 3. Special topics in the design of concrete structures. Combined footings, retaining walls, two-way slabs, and prestressed concrete. Prerequisite: CEE 4320.
- 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, and class notes.
- Coordinator: E.P. Ryan, Associate Professor of Civil Engineering
- Goal: The goal of CEE 4360 (5360) “Advanced Topics in Structural Concrete Design” is to give the students a better understanding of the details involved in the complete design of a reinforced concrete structure and to introduce them to the concepts of prestressed concrete analysis and design.

Course learning objectives:

1. The student is to become aware of the complexities of reinforced concrete design.
2. The student is to become aware of fundamental concepts of prestressed concrete analysis and design.
3. The student is to develop an ability to apply the concepts in the analysis and design of prestressed concrete structures.

Course measurable outcomes:

Students will be expected to:

1. design a reinforced concrete cantilever retaining wall, including
 - (a) calculation of lateral earth pressures
 - (b) stability check of the wall
 - (c) structural design of stem, base, key (if required)
 - (d) construction drawing of wall;
2. understand prestressed concrete analysis and design concepts; and
3. analyze and design prestressed concrete beams.

Topics covered: (Three lecture classes per week, 55 minutes each)

1. Retaining wall design (11 classes)
2. Two-way slab design (6 classes)
3. Prestressed concrete design
 - a. Basics concepts (1 class)
 - b. Flexural analysis (7 classes)
 - c. Beam design (7 classes)
 - d. Composite design (6 classes)
4. Tests (3 classes)
5. Review (1 class)

Contribution of the course to meeting professional component:

This is a part of engineering topics of the curriculum. It is a design elective with a significant design content.

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

Program Criteria

Bloom's Level of Achievement

1. Apply knowledge of math and sciences	3
2. Apply knowledge of four technical areas appropriate to civil engineering	4
3. Design a system, component, or process in more than one civil engineering context	5

Computer usage: None

Laboratory projects: None

Prepared by: E.P. Ryan

Date: September 2007