Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 4350 (5350) – Advanced Structural Design
Elective
Fall Semester 2007, Spring Semester 2008

2007 Catalog Data:	CEE 4350 (5350): Advanced Structural Design. Lecture 3. Credit 3. Special topics in analysis and design of steel structures. Plastic design, composite design, plate girders, special connections. Prerequisite: CEE 4310.
Textbook:	Jack C. McCormac, *Structural Steel Design, LRFD Method*, Fourth edition, 2007.
Reference:	*AISC Manual of Steel Construction, Load and Resistance Factor Design*, Thirteenth edition, 2005.
Coordinator:	X. Huo, Associate Professor of Civil Engineering
Goal:	The goal of CEE 4350 (5350) "Advanced Structural Design" is to extend the student's knowledge on several advanced topics in analysis and design of steel structures.

Course learning objectives:

1. The student is to understand the behavior of structural members and connections.
2. The student is to understand the fundamental principles of the analysis and design of structural steel members and connections in combined loading cases or in certain structural arrangements.
3. The student is to develop an ability to analyze and design the structural members and connections in moderately complex structural arrangements in a manner that ensures the safety and utility of the structure.

Course measurable outcomes:

Students will be expected to:

1. understand the fundamental design principles of slender-element compression members;
2. determine the required design strength for beam-columns from a second-order elastic analysis procedure or an approximate second-order analysis procedure, and be able to design the beam-column;
3. analyze and design of connections in combined loading cases including combined tension and bending, combined shear and torsion, and combined shear and bending, etc.;
4. understand the behavior and design principles of plate girders and composite beams, and be capable of the design of these members; and
5. understand some current commercial software and its application in structural design.

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

1. Design principles of slender-element compression members (3 classes)
2. Design principles of flexural-torsional buckling strength (2 classes)
3. Thorough treatment of combined bending and axially loaded member (8 classes)
4. In-depth treatment of simple building connections and special connections (14 classes)
4. Design of plate girders (6 classes)
5. Composite design for beams (6 classes)
6. Tests (3 classes)

Contribution of the course to meeting professional component:

This course 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:

General Criteria		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	3
(3i)	Need for life-long learning	2
(3k)	Techniques, skills, modern tools for engineering practice	4

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:

1. Structural computer software is utilized by the student as an aid in analyzing structural systems which are to be designed.

Laboratory projects: None

Prepared by: X. Huo Date: September 2007