

Tennessee Technological University  
Department of Civil & Environmental Engineering  
CEE 4310 – Structural Steel Design  
Required  
Fall Semester 2007, Spring Semester 2008

- 2007 Catalog Data: CEE 4310. Structural Steel Design. Lecture 2. Recitation 2. Credit 3.  
Design of members and structures in steel. Analysis and design of beams, tension members and compression members, members with combined stresses and standard connections. Prerequisite: CEE 3320.
- Textbook: McCormac, *Structural Steel Design, LRFD Method*, Fourth edition, 2007.
- Reference: AISC *Steel Construction Manual – Load and Resistance Factor Design*, Thirteenth edition, 2005.
- Coordinator: X. Sharon Huo, Associate Professor of Civil Engineering
- Goal: The goal of CEE 4310 “Structural Steel Design” is to introduce the student to the behavior and design of steel structures, encountered in the practice of Civil Engineering.

Course Learning Objectives:

1. The student is to develop an ability to interpret and use specifications and design tables and charts in the Manual of Steel Construction.
2. The student is to develop an ability to calculate load capacity of a prescribed steel shape or select a shape based on prescribed loads for:
  - (a) tension members
  - (b) compression members
  - (c) beams
  - (d) a combination of bending with either tension and compression
3. The student is to develop an ability to describe failure modes for the steel structural elements prescribed above.
4. The student is to develop an ability to describe failure modes and to calculate load capacity of elementary connections.

Course measurable outcomes:

Students will be expected to:

1. calculate the appropriate load case based on a variety of loading conditions;
2. describe tension member failures as well as analyze and/or design (select) appropriate sections for tensile loads;
3. describe compression member failures as well as calculate load capacity of compression members and/or select appropriate sections based on calculated compressive loads;
4. describe beam failures for laterally supported and laterally unsupported beams as well as calculate load capacity and/or select appropriate sections based on prescribed load cases; and
5. describe connection failure and calculate load capacity.

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

1. Introduction and review (1 class)
2. Specifications, properties of structural steels, factors of safety (2 classes)
3. Design of tension members (5 classes)
4. Design of compression members (4 classes)
5. Beam design (10 classes)
6. Bending and axial (1 class)
7. Connections (5 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, process in more than one civil engineering context	5
3. Apply knowledge of four technical areas appropriate to civil engineering	4

Computer usage:

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

Recitations:

1. Solutions of various structural steel design problems and projects (11 weeks)
2. Tests (3 weeks)

Laboratory Projects: None

Prepared by: X. Sharon Huo

Date: September 2007