

New Jersey Institute of Technology

CE 432 - Structural Steel Design

Spring 2017

**Text:** Segui, William, Steel Design, 5th Edition, Cengage Learning ISBN: 13-978-1-111-57600-4, and AISC Steel Construction Manual - 14th Edition. Students can purchase the manual directly from AISC with discount code from CEE Department Prof. Wecharatana

Dr. Methi Wecharatana, Room 219 Colton Hall, 973-596-2458,

**Instructor:** [methi@njit.edu](mailto:methi@njit.edu); Office Hours: Monday: 1-3 PM, Tuesday 5:30-6:30 PM

**Prerequisite:** *A working knowledge of structural analysis including determinate and indeterminate beams and frames is essential. The development of current design procedures for structural steel elements and their use in multistory buildings, bridges, and industrial buildings.*

Week	Topics	Pages	Problems (To be assigned in class)
1	Introduction to Steel Design, Concepts, Specifications and Applied Loads	Chapter 1,2 Page 1-40	To be assigned in class
2	Tension Members	Chapter 3 Page 41-108	
3,4	Compression Members	Chapter 4 Page 109-188	
5	Introduction to Beams	Chapter 5 Page 189-298	
6	Review & Qui (2 hrs.)	Open Book- Open Note	
7,8	Beam Design and Analysis	Chapter 5 Page 189-298	
9,10	Beam Columns	Chapter 6 Page 299-376	
11	Review & Quiz(2 hrs.)	Open Book/Open Note	
12	Simple Connections	Chapter 7 Page 377-476	
13	Eccentric Connections	Chapter 8 Page 477-592	
14	Plate Girders	Chapter 10 Page 665-717	
15	Final Exams (2.5 hrs.)	Open Book/Open Note	

## GRADING:

Homework and Attendance	10%
Quizzes	60%
Final Exam	30%
Total	100%

\*The NJIT Honor Code will be upheld and any violations will be brought to the immediate attention of the Dean of Students.

\*Students will be consulted with by the instructor to any modifications or deviations from the syllabus throughout the semester.

Department of Civil and Environmental Engineering

### **CE 432 – Structural Steel Design**

#### **Description:**

Design of tension members, beams, columns, beam columns, connections and plate girders.

**Prerequisites:** CE 332-Structural Analysis  
CE 260 – Civil Engineering Methods

#### **Textbook (s) Materials Required:**

Segui, Williams, Steel Design, 5<sup>th</sup> Edition, Cengage Learning ISBN: 13-978-1-111-57600-4 and AISC Steel Construction Manual – 14<sup>th</sup> Edition Students can purchase the manual directly from AISC code from Prof. Wecharatana.

2. AISC Steel Construction Manual, AISC, 14<sup>th</sup> Edition

#### **Course Objectives:**

1. Illustrate and develop methodologies, and introduce and employ the concept of codes and specifications for structural steel members and elementary structures.
2. Apply and enhance the knowledge of strength of materials and structural analysis.
3. Incorporate proper use of modern engineering tools for problem solving and communication.

#### **Topics:**

Introduction

Analysis and Design of Tension Members

Compression Members

Beam-Columns

Connections

Plate Girders

**Schedule:** Lecture/Recitation – 3 hour class, once per week

Laboratory – none

**Professional Component:** Engineering Topics (Design)

**Program Objectives Addressed:** 1,2

Prepared By: Prof. Methi Wecharatana

Date: 1/20/15

### **CEE Mission, Program Objectives and Program Outcomes**

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program objectives are reflected in the achievements of our recent alumni.

1 – Engineering Practice: Recent alumni will successfully engage in the practice of civil engineering within industry, government, or private practice, working in a wide array of technical specialties including construction, environmental, geotechnical, transportation, and water resources.

2 – Professional Growth: Recent alumni will advance their skills through professional growth and development activities such as study in engineering, professional registration, and continuing education; some graduates will transition into other professions such as business and law through further education.

3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, civic organizations, and humanitarian endeavors.

Our program outcomes are what students are expected to know and be able to do by the time of their graduation:

- (a) ability to apply knowledge of math, science, and engineering
- (b) ability to design and conduct experiments, as well as interpret data
- (c) ability to design a system, component or process to meet desired needs within realistic constraints such as economic, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) ability to function in multi-disciplinary teams
- (e) ability to identify, formulate, and solve engineering problems
- (f) understanding of ethical and professional responsibility
- (g) ability to communicate effectively
- (h) broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) recognition of need for, and an ability to engage in life-long learning
- (j) knowledge of contemporary issues
- (k) ability to use techniques, skills and modern engineering tools necessary for engineering practice

Course Objectives Matrix – CE 432 Structural Steel Design

Strategies and Actions	Student Learning Outcomes	Outcomes (a-k)	Prog. Object	Assessment Methods/Metrics
<b>Course Objective 1: Illustrate and develop the design methodologies, and introduce and employ the concept of codes and specifications for design of structural steel members and elementary structures.</b>				
Illustrate load and resistance factor design LRFD and allowable stress design (ASD) philosophies. Formulate the LRFD methodology.	Learn basic design concepts and modes of failure.	a,c,e,i,j	1,2	Homework, projects, quizzes, and exams.
	Learn the relationship between theoretical concepts and design procedures	a,c,e	1	Homework, projects, quizzes and exams.
Discuss AISC Construction Manual Load & Resistance Factor Design (LRFD).	Gain professional knowledge required to design safe, serviceable and economical steel structures.	a,c,e,f,h	1	Homework, quizzes, and final exam.
<b>Course Objective 2: Apply and enhance the knowledge of strength of materials and structural analysis.</b>				
Incorporate and apply basic knowledge of strength of materials and structural analysis.	Learn the concept of composite sections based on characteristics of constituent materials. Apply knowledge of shear, moment and deflection diagrams.	a,c,e	1	Homework, quizzes, and final exam.
<b>Course Objective 3: Incorporate proper use of modern engineering tools for problem solving and communication.</b>				
Introduce state of the art analysis and design software (STAAD/Pro), and code.	Learn how to use the latest technology in solving structural analysis and	c,e,k	1,2	Homework and projects that are solved using STAAD/Pro, and AISC Manual

	design problems.			
Discuss the pitfalls with “black box” use of computers and interpretation of computer output.	Learn how to use modern technology properly and effectively.	k	1,2	Certain homework and projects are solved both manually and by STAAD/Pro, and AISC Manual
Place assignments and course syllabus on the internet. Use e-mail for communication.	Learn how to use information technology.	k	1,2	None.

