

Spring 2020

## CE 432-102: Structural Steel Design

Raj Navalurkar

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New Jersey Institute of Technology

CE 432 - Structural Steel Design

Spring 2020

Section: 102

**Text:** Segui, William, Steel Design, 6th Edition, Cengage Learning ISBN: 978-1337094740 and AISC Steel Construction Manual - 14th Edition. Students can purchase the manual directly from AISC with discount code from CEE Department Prof. Wecharatana

**Instructor:** Prof. Raj Navalurkar, [Rajendra.navalurkar@parsons.com](mailto:Rajendra.navalurkar@parsons.com)  
Cullimore Hall LECT 3 Monday 6-9:05PM

**Prerequisite:** CE 332. 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 course of the semester.

*“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:*

*<http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.*

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at [dos@njit.edu](mailto:dos@njit.edu)”

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 with discount 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 design of 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

### Course Objectives Matrix – CE 432 Structural Steel Design

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
<b>Student Learning Outcome 1:</b> Apply design methodologies and concept of codes and specifications for structural steel members and elementary structures.			
Illustrate load and resistance factor design LRFD and allowable stress design (ASD) philosophies. Formulate the LRFD methodology.	1, 2	1, 2	Homework, projects, quizzes, and exams.
Discuss AISC Construction Manual Load & Resistance Factor Design (LRFD).		1	
<b>Student Learning Outcome 2:</b> Apply and enhance the knowledge of strength of materials and structural analysis.	1, 2	1	Homework, quizzes, and exams.
Incorporate and apply basic knowledge of strength of materials and structural analysis.			
<b>Student Learning Outcome 3:</b> Use modern engineering tools for problem solving and communication.	1, 2	1	Homework, quizzes, and exams.
Introduce state of the art analysis and design software (STAAD/Pro), and code.			
Discuss the pitfalls with “black box” use of computers and interpretation of computer output.	7	1, 2	Homework and projects using STAAD/Pro, and AISC Manual.
	7	1, 2	Certain homework and projects solved both manually and using STAAD/Pro, and AISC Manual.

### CEE Mission, Program Educational Objectives and Student 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 educational objectives are reflected in the achievements of our recent alumni:

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

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

3 – Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

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

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Revised: 2/13/18