

Fall 2024

## **CE 432 -103: STEEL DESIGN**

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## CEE 432 – 103: Steel Design

(2 credits)

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**Lectures**                      Fridays    6:00 pm - 8:50 pm; Face-To-Face  
   CKB 314

**Instructor**            Dr. Avinash Prasad; PE, PLS, PP, F.ASCE      Office Hours: Online by appointment  
                                 Avinash.prasad@njit.edu  
                                 201-873-8089

**Prerequisite:** CE 332. A working knowledge of structural analysis including determinate and indeterminate beams and frames are essential. The development of current design procedures for structural steel elements and their use in multistory buildings, bridges, and industrial buildings.

### **Required Textbook**

Segui, William, Steel Design, 6th Edition, Cengage Learning ISBN: 978-1337094740 and AISC Steel Construction Manual - 16th Edition. Students can purchase the manual directly from AISC with Discount code from CEE Department Prof. Methi

### **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

### **Topics:**

Introduction  
Analysis and Design of Tension Members  
Compression Members  
Beam-Columns  
Connections  
Plate Girders

## **POLICIES & PROCEDURES**

**Academic Integrity:** It is expected that NJIT's University Code on Academic Integrity will be followed in all matters related to this course. Refer to NJIT's Dean of Students website to become familiar with the Code on Academic Integrity and how to avoid Code violations.

<https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>

**Communication:** All communication by the instructor will be done through Canvas/email. It is your responsibility to check your e-mail, and the course page on Canvas/email regularly.

**Lectures/Class:** This is a Face-To-Face course. Attendance to all lecture/class periods is expected. Please turn all cell phones off during class and be respectful to the course instructor and your classmates.

**Handouts:** No Handouts; Lectures will be posted on Canvas.

**Homework:** Homework will be posted on Canvas. It will be worked individually.

**Late Homework:** No late Homework is allowed.

**Homework Solutions:** Homework solution will be posted on Canvas after its due date.

**Exams: TBD**

**Calculation of Course Grade:** A weighted average grade will be calculated as follows:

Homework	15%
Quizzes	30%
Attendance & Participation	10%
MT	20%
Final Exam	25%

The minimum requirements for final letter grades are as follows:

A = 90.0%, B+ = 85.0%, B = 80.0%, C+ = 75.0%, C = 70.0%, D = 60.0%, F < 60.0%

**Instructor Commitment:** You can expect the instructor to be courteous, punctual, organized, and prepared for lecture and other class activities; to answer questions clearly; to be available during office hours or to notify you beforehand if office hours are moved; to provide a suitable guest lecturer or pre-recorded lecture when they are traveling or unavailable; and to grade uniformly and consistently.

**Students with Documented Disabilities:** NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact the Coordinator of Student Disability Services located in the Center for Counseling and Psychological Services, in Campbell Hall, Room 205, (973) 596-3414. Further information on disability services related to the self-identification, documentation, and accommodation processes can be found on the webpage at: (<http://www.njit.edu/counseling/services/disabilities.php>)

**Course Schedule:**

Week	Proposed Topics	
1	Introduction to Steel Design, Concepts, Specifications and Applied Loads	Chapter 1 & 2
2	Tension Members	Chapter 3
3 & 4	Compression Members	Chapter 4
5	Review & Quiz#1	Open Book-Open Notes
6	Introduction to beams	Chapter 5
7	Beam Design & Analysis	Chapter 5
8	Midterm Exam	Open Book-Open Notes
9 & 10	Beam Columns	Chapter 6
11	Simple Connection	Chapter 7
12	Review & Quiz#2	Open Book-Open Notes
13	Eccentric Connection	Chapter 8
14	Plate Girder & Final Exam Review	Chapter 10
15	Final Exam	Open Book-Open Notes

\*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.



Course Objectives Matrix – CE 432-103 (Steel Design)

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

## **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 safe, practical, resilient, 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 technical and interpersonal 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