Department of Civil and Construction Engineering and Management

CENG4317 – Structural Steel Design

CATALOG DESCRIPTION

Design of structural elements in steel buildings, in particular the design of steel tension members, beams, columns, beam columns, and connections. Composite members and plate girders. Emphasis on the AISC-LRFD Specifications for steel design, with comparisons made where appropriate to ASD Specifications. (3 Credit hours)
Prerequisite: CENG 3325

INSTRUCTOR

Mohamed Afifi, PhD, PE
RBS 1036
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COURSE WEBSITE

All course materials will be managed through **Canvas**. Lecture Recordings will be posted on **YouTube**. Homework assignments, solutions, handouts, and other class-related resources will be posted there. Please make sure to check Canvas regularly for updates.
YouTube Link:
https://www.youtube.com/playlist?list=PL4OlhKxVHV8W8bWUacwdgCNTucPDrC1rl

SCHEDULE

The course will be offered online including all lectures, exams and office hours.
Lectures: Tuesdays and Thursdays 11:00am – 12:20pm
Instructor office hours: Tuesdays and Thursdays 12:30pm-1:30pm

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LEARNING OBJECTIVES

By the end of this course, you will be able to:

1. **Design real buildings** – Take functional requirements and an architectural concept, then create the structural design for a low-rise steel or concrete building.
2. **Understand materials** – Explain how structural steel behaves and what makes it strong, versatile, and unique.
3. **Weigh design choices** – Compare the pros and cons of using steel versus reinforced concrete in building design.
4. **Master the design process** – Apply the full engineering design cycle, from problem definition to solution.
5. **Perform realistic load analysis** – Use ASCE 7 to calculate dead, live, snow, roof, and wind loads.
6. **Apply load combinations** – Use LRFD equations to combine loads and check structural safety.
7. **Simplify complex structures** – Reduce a 3D frame to a 2D model while accounting for loads, connections, and out-of-plane behavior.
8. **Use modern tools** – Employ engineering software to analyze and design structural systems efficiently.

REQUIRED TEXTS

AISC Manual of Steel Construction (16th Edition)
Lectures and other handouts will be made available via Canvas.

GRADING POLICY

Practice Questions	25%
Class Tests	45%
Final Exam	30%

ATTENDANCE POLICY

Students are responsible for all information covered in class, regardless of whether it appears in the lecture notes or other handouts.
Attendance and participation in sessions is mandatory.

University Policies and Information for Students

Attendance, academic honesty, accessibility services, campus carry, tobacco-free campus, and other policies are as per UT Tyler guidelines. Please refer to the official UT Tyler resources.

The final day to withdraw from the course without penalty is March 30th, 2026.

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TENTATIVE COURSE SCHEDULE

Week Starting	Topic
12-January	Introduction Structural Analysis Review Load Cases & LRFD Philosophy
19- January	Steel: Material properties Tension members
26-January	Compression Members
2-February	Beams: Flexure & Shear (1/2)
9-February	Beams: Flexure & Shear (2/2) Review Session
16-February	**Midterm Exam 1**
23-February	Beam-Columns
2-March	Simple Connections
9-March	SPRING BREAK – NO CLASSES
16-March	Eccentric Connections
23-March	**Midterm Exam 2**
30-March	Composite Construction
6-April	Plate Girders
13-April	Introduction to Cold-Formed Steel Design Course Review
20-April	**Final Exam – Comprehensive**

ASSIGNMENTS/Practice Questions

Practice Questions will be assigned regularly as per the course schedule. Due dates will be indicated on each assignment.

You must submit your assignment as a single PDF file via Canvas by 11:59 PM on the due date.

EXAMS

There will be **two midterm exams** all held **online from 5:00–7:00 PM**. Please plan accordingly, as attendance at these scheduled times is required.

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Guidelines:

- Exams are Open notes.
- The only references allowed are your personal copies of the *AISC Steel Construction Manual*, along with an approved calculator.
- Manuals must be your own—borrowing or sharing is not permitted.
- Handwritten notes and tabbing within your own manual are encouraged, but no loose sheets or pasted materials may be added.
- Approved calculators: TI-30 (or FE-equivalent).
- Solutions will not be posted on Canvas.

Make-up exams:

- Make-up exams will only be granted for documented medical emergencies or serious hardships with prior approval from the instructor.
- Missing an exam without proper documentation will result in a **zero**.

RECORDINGS

Class sessions may be recorded by the instructor for the use of students enrolled in this course. Recordings that include personally identifiable information or other sensitive content protected under FERPA will not be shared with anyone outside the course without the consent of all relevant students. Recordings are intended only for educational use by enrolled students and must not be distributed or shared outside the course without explicit permission.

Academic Misconduct

Plagiarism on homework and cheating on exams are considered academic misconduct and will not be tolerated. Please refer to the University of Texas at Tyler Undergraduate Catalog and the Manual of Policies and Procedures for Student Affairs (MOPPS, Chapter 8) for university policies on academic integrity, cheating, and plagiarism. Ignorance of these policies does not excuse violations. All incidents of academic dishonesty will be addressed according to university rules.

Collection of Student Work

During the semester, selected student work (best, average, and below-average examples) may be collected for inclusion in ABET outcomes notebooks. This process will involve making a copy of your work while returning the original graded assignment to you. Your individual performance level will not be disclosed when samples are used.

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CALCULATOR POLICY

Only NCEES-approved calculators are permitted during examinations. Use of a non-approved calculator will result in your exam being collected immediately and a grade of zero assigned.

Approved calculators include the following (see the official NCEES website for the complete list: www.ncees.org/exams/calculator-policy/):

- Hewlett Packard: HP 33s, HP 35s (no others permitted)
- Casio: All FX-115 models
- Texas Instruments: All TI-30X and TI-36X models

It is the student's responsibility to confirm that their calculator is approved. If you are unsure, check with the instructor prior to the exam.

At the discretion of the instructor, a non-approved calculator (e.g., a graphing calculator) may be permitted only if it is inspected and all memory is cleared immediately prior to the exam. During the exam, calculators are subject to random inspection. Failure or refusal to clear memory, or to surrender a calculator for inspection, will result in immediate disqualification from the exam unless you can provide an approved calculator as listed above.

AI POLICY

The use of artificial intelligence (AI) tools is not permitted in this course under any circumstances. All submitted work must represent your own original effort. Assignments and class activities have been carefully designed to support your learning and completing them independently is essential to mastering the course objectives.

The use of ChatGPT or any other AI-based tools—at any stage of the work process, including idea generation, drafting, or revisions strictly prohibited. Any deviation from this policy will be treated as a violation of the UT Tyler Honor Code and the university's standards of academic integrity.

SYLLABUS DISCLAIMER

This syllabus serves as a formal statement of intent regarding how the course will be conducted during the semester. It provides an outline of the topics to be covered, the requirements you are expected to fulfill, and the timeline necessary for successful completion of the course. The syllabus is designed to ensure fairness and to prevent arbitrary or untimely changes to course expectations.

However, the instructor reserves the right to make modifications to the syllabus when necessary. Any such changes will be communicated in advance and reflected in the updated syllabus posted on Canvas. As demonstrated during the disruptions of 2020, unforeseen circumstances beyond our control may require adjustments to course content, requirements, or scheduling. In such cases, every effort will be made to provide timely updates and clear guidance.

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