

CEE 159: STRUCTURAL ANALYSIS I (4CR)

Instructors:

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Course:

CEE 159, Structural Analysis I
Summer 2026
Class Hours: M-R, 8:00 am – 9:35 am
Classroom: Fritz 232
Final Exam: Saturday August 15th

Course Description:

Elastic analysis of statically determinate beams, frames, and trusses; deflections by the methods of virtual work and moment area; influence lines for determinate structures; modeling for structural analysis; flexibility, stiffness, and approximate methods of analysis of indeterminate structures. Prerequisite: CEE 59 or MECH 12.

Textbook: *Structural Analysis*, 11th Ed. by R.C. Hibbeler, Prentice Hall.

Reference Materials: Structural analysis software: SAP 2000.

Tentative Grading: Homework (30%), Two Midterm Exams (35%), Comprehensive Final Exam (35%)

Course Conduct:

- **Attendance.** The University attendance regulations and CEE department attendance will be followed in CEE 159.
- **Examinations:** Two midterm exams and a final exam will be scheduled for the class. No makeup examinations will be given except for properly documented emergency situations. In general, the opportunity for make-up is granted only when there are extenuating circumstances.
- **Assignments:**
 - **In class lecture handouts** will be completed and submitted by each student as assigned.
 - **Homework assignments** will be submitted by each student as assigned.
 - **Any work below 70% will be supplemented with additional individual assignment for the student.**
 - **Homework solutions should conform to the standards of good engineering practice**
 - Clearly labeled on numbered pages.
 - Your name, assignment number, and page number should appear on each page.
 - Each problem should start in a new page, and consist of following segments: 1- given data, 2- statement of what is to be found, 3- the solution, and 4- the answer
 - Work should be **organized and presented neatly**. Assumptions should be clearly stated, units should be noted on answers and key intermediate results, and answers should be clearly identified.

Homework **points will be deducted** if any the preceding requirements are not followed.

- **Academic integrity:** It has been my experience in the past that when students study in groups, and communicate they perform better. Obviously, this is a generalization and I am sure there are many exceptions. However, please note that your submitted work for this

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course should be conducted individually. Academic Integrity is expected from all students in all matters related to this course. In particular, a student assumes responsibility for every assignment, project or exam that he/she submits. University Code of Conduct:

<https://studentaffairs.lehigh.edu/content/code-conduct>.

- **Accommodations for Students with Disabilities:** If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, University Center 212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.
- **Principles of Equitable Community:** Lehigh University endorses The Principles of Our Equitable Community http://www.lehigh.edu/~inprv/initiatives/PrinciplesEquity_Sheet_v2_032212.pdf. We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

Course Learning Objectives:

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

1. Apply the equilibrium conditions to structures to determine their stability and determinacy.
2. Apply the equilibrium conditions to determine the reactions of statically determinate structures such as trusses, beams, and frames.
3. Apply the equilibrium conditions to statically determinate trusses to determine the internal forces using the method of joints or the method of sections; to classify trusses as simple, compound, or complex.
4. Apply the equilibrium conditions to statically determinate beams, compound beams, and frames to determine the internal forces (moment, shear, and axial force diagrams).
5. Apply the equilibrium conditions to cables and statically determinate arches to determine the shape, reactions, and internal forces.
6. Apply basic principles of structural mechanics (equilibrium, kinematics, virtual work) to statically determinate beams and compound beams to determine the influence lines for reactions, bending moments, and shear forces.
7. Apply the basic principles of structural mechanics (equilibrium, material law, compatibility of deformations) to determine deflections and rotations of statically determinate structures using the methods of double-integration, moment area, and virtual work.
8. Apply the basic principles of structural mechanics to statically indeterminate structures such as continuous beams, frames, and trusses to determine the reactions and internal forces using the force method of analysis.

Tentative Course Outline / Topic:

Weeks	Topic	Reading Assignment
1	Course Introduction and Motivation, Types of Structures Superposition, Equilibrium, Determinacy and Stability	Chapter 1 and 2
2	Determinate Trusses	Chapter 3

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Weeks	Topic	Reading Assignment
3	Computer Aided Analysis	
3 and 4	Determinate Beams and Frames	Chapter 4
4	Cables and Arches	Chapter 5
5	Influence Lines	Chapter 6
Midterm Exam 1, Thursday June 25th		
6 and 7	Deflection	Chapter 7
8 and 9	Deflections Using Energy Methods	Chapter 8
Midterm Exam 2, Thursday July 30th		
10 and 11	Force Methods – Indeterminate Structures	Chapter 9
Additional	Approximate Methods	Chapter 12
Final Exam: Comprehensive Final Saturday August 15, 2026)		

No Class Date:Memorial Day, Monday May 25th**Makeup Date:**Friday, May 29th

Last Day of Classes: Thursday August 13, 2026

Fina Exam: Saturday August 15, 2026

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