



CEN 327 Structural Analysis and Design I

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email:TBA

COURSE OBJECTIVES

This course serves as an introduction to the fundamental principles and methods underlying the analysis of structures. Students will develop a comprehensive understanding of the behavior of statically determinate and indeterminate beams, frames, trusses, cables, and arches. The course covers various analytical techniques to determine forces, deflections, and other structural responses under different loading conditions.

Upon Completion of this Course, students will be able to:

1. Demonstrate a solid understanding of static equilibrium principles;
2. Understand and apply the force method, flexibility method, slope-deflection method, and moment distribution method for analyzing statically indeterminate beams, frames, and trusses;
3. Utilize methods such as the moment-area method, conjugate-beam method, and virtual work methods for structural analysis;
4. Understand and use moment distribution method for analyzing structures;
5. Apply deflection analysis techniques to determine the deformation of beams and frames.

PREREQUISITES

ENR 121 Mechanics of Materials; CEN 291 Introduction to Civil Engineering Mechanics

GRADING



Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

| ITEM | POINTS |
|------------------|------------|
| 3 Quizzes | 30 Points |
| 2 Group Projects | 20 Points |
| Midterm | 20 Points |
| Final Exam | 30 Points |
| Total | 100 Points |

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Russell C. Hibbele, *Structural Analysis*, 10th Edition, Pearson, 2018.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

| MODULE | TASKS |
|----------|---|
| Module 1 | <p>Topics: Topic 1: Classification of Structures Topic 2: Tie Rods, Beams, Columns Topic 3: Types of Structures Topic 4: Method of Virtual Work: Beams and Frames</p> <p>Assessments: Quiz#1</p> |
| Module 2 | <p>Topics: Topic 5: Castigliano's Theorem for Beams and Frames Topic 6: Force Method of Analysis: Beams Topic 7: Deflection Diagrams and the Elastic Curve Topic 8: Deflections Using Energy Methods</p> |



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| | Assessments: Quiz#2 Group Project#1 |
| Module 3 | Topics: Topic 9: Slope-Deflection Equations Topic 10: Moment-Area Theorems Topic 11: Conjugate-Beam Method Topic 12: Principle of Work and Energy Assessments: Midterm |
| Module 4 | Topics: Topic 13: Method of Virtual Work: Trusses Topic 14: External Work and Strain Energy Topic 15: Statically Indeterminate Structures Topic 16: Influence Lines for Statically Indeterminate Beams Assessments: Quiz#3 Group Project#2 |
| Module 5 | Topics: Topic 17: Force Method of Analysis: Trusses Topic 18: Force Method of Analysis: Trusses (Cont.) Topic 19: Moment Distribution for Beams Topic 20: Cables, Arches, Loads, Structures Assessments: Final Exam |

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share



with fellow colleagues.

LEARNING REQUIREMENTS

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.



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Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.