Soochow University

CEN 327 Structural Analysis and Design I

Winter 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 ≥ 90 > B ≥ 80 > C ≥ 70 > D ≥ 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	**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 **Assessments:** Quiz#1
Module 2	**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

	Assessments:
	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
	Quiz#2
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:
	Group Project#2
Module 5	**Topics:**
	Topic 17: Force Method of Analysis: Trusses
	Topic 18: Slope-Deflection Equations
	Topic 19: Moment Distribution for Beams
	Topic 20: Cables, Arches, Loads, Structures
	Assessments:
	Final Exam
	Quiz#3

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).

ACEDEMIC 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.

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.