CE 332 - Structural Analysis Summer 2017

Text: Hibbeler, Russell C., Structural Analysis, 9th Edition, Prentice Hall
ISBN: 0-13-394284-8

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Prerequisites: *Mech 237, Mech 237A,CE260. A working knowledge of free body diagrams, equilibrium conditions for force systems and moments. The primary objective is an understanding of the various methods of analyzing determinate and indeterminate beams, frames, and trusses encountered in practice.*

Week	Topic	Chapter	Homework
1	Introduction, Stability and Classification of Structural Behavior	1, 2	To be assigned in the classroom
2	Analysis of Determinate Trusses: Methods of Joints and Sections	3	Students will be required to do some homework problems in class Prior notice will be provided of the topic
3	Analysis of Determinate Beams and Frames	4	
4	Influence Lines: Moving Loads	6	
5	Introduction to Approximate Analysis of Structures	7	Self-study
6	Computer Program - TBD		
7	Deflection of Trusses: Virtual Work Method (Unit Load Method)	8, 9	
8 & 9	Deflections: Moment area, integration, and conjugate beam methods	8, 9	
10	Indeterminate Structures: Consistent Deformation Method	10	
11	Indeterminate Structures: Slope Deflection Method	11	
12 & 13	Indeterminate Structures: Moment Distribution Method	12	

14	One week saved for quizzes and reviews		
15	Final Exam		

ATTENDANCE:

Attendance may be taken at the beginning of each class.

QUIZZES:

There will be two quizzes given in the semester. The quizzes will be closed books. A page of 8 x 11 in. note will be allowed during tests.

No make up quizzes will be given. The grade for the final exam will be proportionately higher
to make up for legitimate missed quizzes. (need a note from a physician etc.)

HOMEWORK: (Also see Homework Instruction below) Problems are given each week to be solved and turned in at the beginning of the first lecture in the week following the assignment. Homework will be checked and returned the following week. To obtain credit, you must submit the work on time and in the proper form. At least 75% of the homework must be submitted on time, and correct, to receive a passing grade in the course. No late homework is allowed.

TUTORIAL HELP: Office hours will be announced during the first week. They will meet approximately twice a week. Students with difficulties are encouraged to see the Professor or the teaching assistant during their office hours.

COMPUTER TUTORIALS: The text book contains a IBM compatible software for additional self study. Students are encouraged to use the software as a supplementary study material.

GRADING:

Homework	15%
Quizzes	40%
Computer Project	10%
Final Exam	35%
Total	100%

The grade scheduling is:

A	=	88 to 100	C	=	65 to 69B+
B+	=	82 to 87	D	=	60 to 64
B	=	76 to 81	F	=	59 or less
C+	=	70 to 75	W	=	Voluntary before deadline (school schedule)

Incomplete = given in rare instances where the student is unable to attend or otherwise do the work of the course due to illness, etc. The grade must be made up in the next semester by completing all of the missed work.

HOMEWORK INSTRUCTIONS

The following are to be observed when handling in homework for grading. Failure to do so may result in significant deductions in the homework grade.

1.	Use 5-square per inch National Computation pad paper ONLY (sold at the NJIT Bookstore). Problems should be done on one side of the 8-1/2 x 11 pad paper.
2.	On the top of each page, in the space provided, Print your instructor's name, section, problem number, student's name (LAST, FIRST) date, and page number.
3.	The problems must be presented in numerical order as assigned, with one problem per page. Letters and numbers must be neat, clear and legible.
4.	Draw neat, clear, free body diagrams as required. Use a straight edge or other drawing instruments as needed.
5.	Box in the final answer accompanied by its units. DO NOT HAND IN CLASS NOTES.
6.	Staple the problems in proper numerical order with a single staple in the upper left-hand corner.

*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.

Department of Civil and Environmental Engineering

CE 332 – Structural Analysis

Description:

Analysis of statically determinate and indeterminate beams, frames, and trusses in civil engineering practices. Influence lines, approximate structural analysis and computer analysis.

Prerequisites: Mech 237 - Strength of Materials

Textbook(s)/Materials Required:

Leet, K., Uang, C., Bilbert, A., Fundamentals of Structural Analysis, McGraw Hill, 3rd Edition, 2008

Course Objectives: Provide the ability to understand the behavior of structures under different loading conditions.

1. Develop the principles and equations for the analysis of statically determinate and indeterminate analysis in preparation for subsequent design courses.
2. Gain experience with commercial structural analysis/design software.

Topics:

Introduction: Stability and Classification of Structural Behavior
Analysis of Determinate Trusses: Methods of Joints and Sections
Deflection of Trusses: Virtual Work Method and Williot-Mohr Diagram
Analysis of Determinate Beams and Frames
Slopes and Deflections: Conjugate Beam Method
Influence Lines: Moving Loads
Indeterminate Structures: Consistent Deformation Method and STAAD III Computer Program
Indeterminate Structures: Slope Deflection Method
Indeterminate Structures: Moment Distribution Method
Rigid Frames: Slope Deflection and Moment Distribution Methods
Approximate Analysis of Structures
Introduction to Matrix Structural Analysis: The Stiffness Method

Schedule: **(3-0-3)**

Professional Component: Engineering Topics

Program Objectives Addressed: 1, 2

Prepared By: Prof. Saadeghvaziri **Date:** 11/06

Course Objectives Matrix – CE 332 Structural Analysis

Strategies and Actions	**Student Learning Objectives**	**Student Outcomes (a-k)**	**Program Educational Objectives**	**Assessment Methods/Metrics**
Course Objective 1: Provide the ability to understand the behavior of structures under different loading conditions.				
Illustrate basic structural applications and static analysis.	Understand basic principles.	a	1	Weekly homework and quizzes.
Discuss the design of structures.	Knowledge of design principles.	c, e	1, 2	Weekly homework and quizzes.

Course Objective 2: Develop the principles and equations for the analysis of statically determinate and indeterminate analysis in preparation for subsequent design courses.				
Develop various methods of analysis.	Learn the importance of these methods in both determinate and indeterminate structures.	a	1, 2	Weekly homework and quizzes.
Provide distinct and detailed examples of how these methods are utilized.	Ability to make the connection between theory and practice.	c, e, j, i	1, 2	Weekly homework and quizzes.
Course Objective 3: Give an introduction to commercial structural analysis/design software.				
Discuss software tools.	Learn to use software tools.	b	1	Lab report.
Analyze assignments using software tools.	Gain experience with commercial software.	c, e, j	1	Review of analysis problems.

CEE Mission, Program Educational Objectives and Program 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: Recent alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Recent alumni will advance their skills through professional growth and development activities such as graduate study in engineering, professional registration, and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, civic organizations, and humanitarian endeavors.

Our program outcomes are what students are expected to know and be able to do by the time of their graduation:

(a) an ability to apply knowledge of math, science, and engineering
(b) an ability to design and conduct experiments, as well as interpret data
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use techniques, skills and modern engineering tools necessary for engineering practice

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