Spring 2022

CE 495-004: Civil Engineering Design II (Structural)

Simon Shim

CE 495-004 CIVIL ENGINEERING DESIGN II (STRUCTURAL)
2022 SPRING
IN-PERSON

NJIT CIVIL AND ENVIRONMENTAL ENGINEERING

Course Description

This class will provide senior students with the overview of structural engineering design practice where they may be engaged in a structural design firm. The class will work on a 40-story commercial building structural design step by step, starting with learning applicable building code, scope of work, structural design criteria, designing floor framing, lateral load resisting system, and foundation system using finite element software (ETABS and SAFE).

Instructor: Simon Shim, P.E., E-mail: shim@njit.edu

(Office Hour: 9:30 AM ~ 10:00 PM or 1:00 ~ 1:30 PM Thursday by appointment)

Suggested Text: Tall Building Design: Steel, Concrete, and Composite Systems, by Bungale S. Taranath (**ISBN**: 978-1466556201)

COURSE SCHEDULE:

WEEK	LECTURE TOPIC	HANDOUT OR HOMEWORK
1	Introduction of course work and team project.	Handout
2	Project team organization and design process.	Handout
3	Overview of structural engineering workflow for existing building and New Building.	Handout
4	Structural design criteria and associated building code Including design loads; Dead Load, Live Load, Wind Load, and Seismic Load, etc and serviceability	Handout
5	Introduction of Floor framing System and structural planning Structural element layout practice (Column, Wall, Beam, Slab) Column Load Takedown with Tributary Area Method	Homework 1
6	Floor framing System and Design II Introduction of Finite Element Software (ETABS) and modelling practice Composite Floor framing Case study using ETABS	Homework 2
7	Floor framing System and Design III Finite Element Modelling (FEM) and Analysis Practice Composite Floor framing Case study using ETABS	Homework 3
8	Introduction of Lateral load resisting system I Finite element Modelling and Analysis Practice I	Handout
9	Lateral load resisting system II Finite element Modelling and Analysis Practice II	Homework 4
10	Lateral load resisting system III Finite element Modelling and Analysis Practice II	Handout
11	Foundation system I Finite element Modelling, Analysis, Design Practice	Handout
12	Foundation system II Finite element Modelling, Analysis, Design Practice	Handout
13	Workshop	

	Team Project Walk-through	
14	Final Team Presentations Submit Team presentation and Report Closing remarks and comments	

Grading Policy:

Grading will be judged based on weights of various assignments, in-class participation, and attendance and final-term project presentation and report. Completeness = Homework 50% (10% of each) + final presentation 25% + final report 25%. Grade = Participation x Completeness).

Grading Scale:

A:	**100-90**
B+:	**89-85**
B:	**84-80**
C+:	**79-75**
C:	**74-70**
D:	**69-60**
F:	**Below 60**

Attendance Policy: all students are encouraged not to miss any classes. In case of emergency absence, students should notify the instructor and team members one week in advance.

Withdrawals:

In order to insure consistency and fairness in application of the NJIT policy on withdrawals, student requests for withdrawals after the deadline will not be permitted unless extenuating circumstances (e.g., major family emergency or substantial medical difficulty) are documented. The course Professors and the Dean of Students are the principal points of contact for students considering withdrawals.

NJIT University Policy on Academic Integrity:

The NJIT Honor Code will be upheld; any violations will be brought to the immediate attention of the Dean of Students. The Honor Code can be found at (https://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf).

Assignment Policy:

All assignments should be returned within the given deadline.

Syllabus Information:

The dates and topics of the syllabus are subject to change; however, students will be consulted with and must agree to any modifications or deviations from the syllabus throughout the course of the semester.

Email Policy: All students are encouraged to communicate in a prompt and proactive manner.

Items Required for this Course:

CE 332- Structural Analysis; CE 333 – Reinforced Concrete Design; a working knowledge of how to analyze a structure for the applied design loads to obtain the shear and moment diagram, as well as deflection of the structure. Some basic knowledge in the design of steel and reinforced concrete members.

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OUTCOMES COURSE MATRIX - CE 495 CIVIL ENGINEERING DESIGN II (STRUCTURAL FOCUSED)

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Identify structural problems in structural building design and understand gravity and lateral load path.			
Present an area-specific structural engineering design problem-solving and practice.	1, 2, 7	1, 2	Periodic progress homework
Student Learning Outcome 2: understand engineering practice and standard to meet goals.			
Discuss specific code, Design Criteria, performance Goals, cost Implication, and safety objectives.	2, 4	1, 2	Periodic progress homework
Student Learning Outcome 3: understand importance of a teamwork and take own leadership through team project.			
Work individually and in Group and present final group project.	3, 5	1, 2	Final project report, and group presentation.

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CEE Mission, Program Educational Objectives and Student 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: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward safe, practical, sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.
2. Professional Growth: Alumni will advance their technical and interpersonal skills through professional growth and development activities such a graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.
3. Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

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

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies