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## CE 495 – 001-101: Civil Engineering Design II (Structural)

(3 credits)

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**Lectures** Day(s) FRIDAY 6:00 PM – 8:50 PM  
KUPF 2028

**Instructor** **Simon Shim, P.E.** Office Hours:  
[shim@njit.edu](mailto:shim@njit.edu) FRIDAY 5:00~6:00 PM  
917-287-0232 by appointment

**Prerequisite** CE 332 Structural Analysis / CE 333 Reinforced Concrete Design  
CE 432 Structural Steel Design  
CE494 Civil Engineering Design I

### Required Textbook

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

### Other Recommended Texts & Reading

### Course Description (from NJIT's course catalog)

Provides students with the type of design experience they would receive if engaged in civil and environmental engineering design practice including incorporating engineering standards and multiple constraints. Students can select from these design areas: structural engineering.

<http://catalog.njit.edu/undergraduate/newark-college-engineering/civil-environmental/civil-engineering-bs/>

### Course Objectives (General)

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

**Course Topic 1:** Understand the workflow of structural engineering design practice to be engaged in a structural design firm during design phase for 40 story commercial building project.

**Course Topic 2:** Learn to interpret applicable building code and associated structural design provisions including design loads such as dead load, live loads, wind load, and seismic load, and structural design criteria for strength and serviceability requirements.

**Course Topic 3:** Understand structural planning and system aligning with client's objectives and architectural vision and design and learn finite element software ETABS and SAFE for floor framing, lateral load resisting system, and foundation analysis and design while understanding gravity load and lateral load path.

## **POLICIES & PROCEDURES**

**Academic Integrity:** It is expected that NJIT's University Code on Academic Integrity will be followed in all matters related to this course. Refer to NJIT's Dean of Students website to become familiar with the Code on Academic Integrity and how to avoid Code violations.

<https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>

*"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: NJIT Academic Integrity Code.*

*Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"*

**Communication:** Email, Canvas, and Zoom/Webex.

**Lectures/Class:** Attendance at lectures and project participation are mostly important in class. All students should fully participate in a project story including planning, analysis, and design and presentation. During the semester and a final presentation, the class will have a group photo and video recording. The final presentation poster will be exhibited in Virtual Space (Spatial).

**Handouts:** All handouts will be made available on Canvas.

**Homework:** Homework will be assigned and conducted individually or in groups.

**Homework Format:** homework will be uploaded to the Cavas. Hand-written or word-typed will be accepted.

**Late Homework:** Late homework will not be accepted.

**Homework Solutions:** Homework solutions will be distributed and discussed during the class.

**Exams:** No exams.

**Calculation of Course Grade:** A weighted average grade will be calculated as follows:

Describe how homework, project participation, presentation, and report, etc. are weighted.	
Homework	30%
Mid-term Presentation	30%
Final Presentation & Report & Model	40%

The minimum requirements for final letter grades are as follows:

A = 90.0%, B+ = 85.0%, B = 80.0%, C+ = 75.0%, C = 70.0%, D = 60.0%, F < 50.0%

Grading will be judged based on weights of various assignments, in-class participation, and attendance and final-term project presentation and report. Completeness = Homework 30% + Mid-

term Presentation 30 % + final presentation and report. Grade = Project Participation (0.0 ~ 1.0) x Completeness.

**Instructor Commitment:** You can expect the instructor to be courteous, punctual, organized, and prepared for lecture and other class activities; to answer questions clearly; to be available during office hours or to notify you beforehand if office hours are moved; to provide a suitable guest lecturer or pre-recorded lecture when they are traveling or unavailable; and to grade uniformly and consistently.

**AI statement:** The use of artificial intelligence (AI) is permitted in this course only when explicitly stated in assignments. If students use AI for any course-related work, they must cite it according to the guidelines provided on the [NJIT Library AI Citation page](#). If you have any questions about AI use in this course, please contact the course instructor before submitting any assignments. In cases where AI use is not allowed, students are expected to complete work without AI assistance to develop their skills in this subject area.

**Students with Documented Disabilities:** NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact the Coordinator of Student Disability Services located in the Center for Counseling and Psychological Services, in Campbell Hall, Room 205, (973) 596-3414. Further information on disability services related to the self-identification, documentation and accommodation processes can be found on the webpage at: (<http://www.njit.edu/counseling/services/disabilities.php>)

#### Course Schedule:

WEEK	LECTURE TOPIC	HANDOUT OR HOMEWORK
1	Introduction of course work and final project and Finite Element Software ETABS Introduction of Finite Element Software	Handout
2	Project team organization and design process. Overview of structural engineering workflow for New Building. <b><u>Concept Design Workshop and Makerspace Visit</u></b>	Homework 1
3	Structural design criteria and associated building code Including design loads; Dead Load, Live Load, Wind Load, and Seismic Load, etc. and serviceability	Handout
4	Floor framing System I Structural element planning and layout practice (Column, Wall, Beam, Slab) and Column Load Takedown with Tributary Area Method <b>Schematic Design Workshop I</b>	Homework 2
5	Floor framing System and Design II Introduction of Finite Element Software (ETABS) and modelling practice Composite Floor framing Case study using ETABS	Handout
6	Floor framing System and Design workshop	Handout
7	Lateral load resisting system I	Homework 3

	Finite element Modelling and Analysis Practice I <b>Schematic Design Workshop II</b>	
8	Lateral load resisting system II Finite element Modelling and Analysis Practice II	Handout
9	Lateral load resisting system III Finite element Modelling and Analysis Practice II	Handout
10	<b><u>Mid-term Presentation</u></b>	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	<b><u>Final Presentations</u></b> Submit Team presentation and Report, closing remarks and comments	

### Course Objectives Matrix – CE 495 – 001-101

Strategies and Actions	Course Student Learning Outcomes	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Methods/Metrics
<b>Course Objective 1:</b> Understand the workflow of structural engineering design practice, where engaged in a structural design firm during design phase for 40 story commercial building project.				
Present a structural engineering design problem-solving and practice	1, 2,7	1, 2,6,7	1, 2	Periodic progress homework
<b>Course Objective 2:</b> Learn to interpret applicable building code and associated structural design provisions including design loads such as dead load, live loads, wind load, and seismic load, structural design criteria for strength and serviceability requirements.				
Discuss specific code, Design Criteria, performance goals, cost implication and safety objectives.	2, 4	1, 2, 4	1, 2	Periodic progress homework
<b>Course Objective 3:</b> Understand structural planning and system aligning with client's objectives and architectural vision and design and Learn finite element software ETABS and SAFE for floor framing, lateral load resisting system, and foundation analysis and design while understanding gravity load and lateral load path.				
Work Individually and in group and present final group project	3, 5	1,2, 3, 5	1, 2	Final Group Project Presentation, and Report

### **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 scholarships among our faculty and students
- to promote service to the engineering profession and society

### **Program Educational Objectives**

Our **Program Educational Objectives** are reflected in the achievements of our recent alumni:

1. **Engineering Practice:** Alumni will successfully engage in the ethical practice of civil engineering within industry, government, and private practice, working towards safe, practical, resilient and 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 as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as academia, 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.

### **Student Outcomes**

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 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 conclusion
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Updated 8/2025