CE 333 - Reinforced Concrete Design	Fall 2017
Texts:	1) Wight, James and MacGregor, James, Reinforced Concrete Mechanics & Design, 7th Ed., Prentice Hall, 2012, ISBN:978-0-13-348596-7 2) (recommended) ACI 318-11, Building Code Requirements for Structural Concrete and Commentary, American Concrete Institute, 2011, http://www.concrete.org/bookstorenet/Productdetail.aspx?ItemID=31811
Instructor:	Dr. M. Ala Saadeghvaziri, Room 216 Colton Hall, Tel: 973-596-5813, ala@njit.edu ; Office hours: Tuesdays 1:00-2:30, Thursdays 10:00-11:30; other times by appointment. Please don't be shy and see me when you need help.

Prerequisites: *CE 332 and CE 260. The student must have a working knowledge of structural analysis including determinate and indeterminate beams and frames. Primary objectives include the following: to acquaint the student with the properties of concrete and steel and with the behavior of reinforced concrete as a structural material; also to develop methods for the design of reinforced concrete structural members such as beams, slabs, footings, and columns. Both ultimate strength design and working stress method will be studied.*

Week	Topics	Contents	Homework Problems
1	Introduction, Material Properties, ACI Mix Design	Chap. 1 & 3	Assigned in class.
2	ACI Structural Design Philosophy, Structural Concrete Systems and Continuity in R.C. Buildings	Chap. 1 &2 5-1, 5-2 10-2, 10-6	
3,4	Flexural Analysis (Strength Method) in beams	4-1 to 4-8	
5,6	Flexural Design (Strength Method) in Rectangular and T-Beams	5-1, 5-2 and 5-3	
7	Shear Design (Strength Method) in Beams	6-1, 6-2, 6-3 & 6-5	
8	Computer use in Structural Analysis and Design of RC Members	Exact time may change depending on progress on other topics and class needs	

9	Strength Method for One-Way Slab Design and Introduction to Two-Way Slab Design	5-1, 5-2 and 5-5	
10	Strength Method for Bond Development Length, Bar Splices and Cutoffs	Chap. 8	
11	Serviceability Requirement-Control of Cracking, Serviceability Requirement-Control of Deflection	9-1 to 9-5	
12	Strength Method for Reinforced Concrete Short Columns	11.1-11.6	
13	Strength Method for Footing Design	15-1 to 15-5	
14	Review and time for quizzes		
15	FINAL EXAM		

HOMEWORK: Read ACI 318-11. Homework design and computer problems will be assigned by the instructor.

GENERAL INFORMATION

Homework problems will be assigned by the instructor. Also, the students are encouraged to solve many additional problems in the text book. During the term, each student is required to complete the following requirements in addition to the requirements previously mentioned.

1. Use Robot (or program of your choice) to design a reinforced concrete structure (to be assigned). Each student upon completion of the project must show ability to model simple structures (including various types of loading and boundary conditions) with a structural analysis and design package. Training on Robot will be provided.

The tests will be open book and (text book only) you will be allowed to bring in the ACI-318-11 Code and Commentary. The final grade will be arrived at on the following basis.

Quizzes (TBD – around 5^{th} and 10^{th} week)	40 Points
Final Exam (15th	35 Points

week)	
Homework	10 Points
Computer Project	15 Points
TOTAL	100 Points

*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 notified well in advance should there be any modifications or deviations from the syllabus throughout the course of the semester.
*No makeup will be given. Under legitimate, documented and extenuating circumstances the grade for the final exam will be used for missed quiz.

CEE Mission, Program 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

As the CEE Department moves into the 21st century, we will continue to build upon our role as an important educator of civil engineers and environmental engineers in the State of New Jersey. Our main vision for the future is continuous quality improvement of students and faculty as NJIT advances in stature both regionally and nationally. Education of bachelor-level civil engineers remains a principal focus of the CEE Department, and to this end, we have established program educational objectives and student outcomes.

Program Educational Objectives

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 toward sustainable solutions 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 transition into other professional fields such as business and law through further education.
3. *Service:* Recent alumni perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, and humanitarian endeavors.

Student Outcomes

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

a. ability to apply knowledge of mathematics, science, and engineering
b. ability to design and conduct experiments, as well as to analyze and interpret data
c. 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 multi-disciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical 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

Revised 8/28/13

Course Objectives Matrix – CE 333 Reinforced Concrete Design

Strategies and Actions	**Student Learning Outcomes**	**Outcomes (a-k)**	**Prog. Object.**	**Assessment Methods/Metrics**
Course Objective 1: Illustrate and develop the design methodologies, and introduce and employ the concept of codes and specifications for design of reinforced concrete members and elementary structures.				
Illustrate ultimate strength and allowable stress design philosophies.	Learn design concepts and modes of failure.	a, c	1, 2	Homework, projects, quizzes, and exams.
Formulate the ultimate strength design methodology.	Learn the relationship between theoretical concepts and design procedures.	a, c, e	1	Homework, Projects, quizzes, and exams.
Discuss the ACI design codes.	Gain professional knowledge required to design safe, serviceable and economical members.	a, c, e, f	1, 2, 3	Homework, Projects, quizzes, and exams.
Course Objective 2: Apply and enhance knowledge of strength of materials and structural analysis.				
Incorporate and apply basic knowledge of strength of materials.	Learn the concept of composite sections based on the characteristics of constituent materials.	a, c, e	1	Homework, quizzes, and final exam.
Incorporate and apply basic knowledge of structural analysis.	Apply knowledge of shear and moment diagrams and influence lines.	a, c, e	1	Homework, quizzes, and final Exam.
Course Objective 3: Incorporate proper use of modern engineering tools for problem solving and communication.				

Introduce state of the art analysis and design software (such as Rivet/Robot, STAAD/Pro, SAP2000 etc.).	Learn how to use the latest technology in solving structural analysis and design problems.	**k**	1, 2	Homework and projects that are solved using STAAD/Pro.
Discuss the pitfalls of computerized analysis and design and the need for sound engineering judgement.	Learn how to use modern technology properly and effectively.	**k**	1, 2	Homework and projects are solved both manually and by STAAD/Pro.
Place some assignments and course syllabus on the internet. Use e-mail for communications.	Learn how to use information technology.	**k**	1	None.
Course Objective 4: Develop decision making skills and provide an environment for independent thinking while encouraging effective teamwork.				
Demonstrate non uniqueness of design solutions.	Learn how to make design decisions considering realistic constraints such as safety, economy and serviceable.	c, e	1, 2	Design problems.
Require independent work on homework and projects, and all quizzes and exams.	Learn how to plan and organize work and enhance problem solving skills.	a, e	1, 2	Homework, projects, quizzes, And final exam.
Require teamwork for some assignments.	Learn the importance of coordination and time management.	d, f, g	1, 2	Homework and Projects.