CE 457 Reinforced Concrete Design 3 Units

USC | SONNY ASTANI DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

ABET Course Syllabus

Course Information, Textbook and Supplementary Materials

Design Kernel

Course Description: Strength and deformation of reinforced concrete; beams in flexure and shear; bond and development of bars; deflections; columns; slabs; footings; introduction to pre-stressed concrete.

Kernel for: BSCE **Required for:** BSCE Structural and BSCE Building Science

Prerequisite: CE 225 Mechanics of Deformable Bodies

Required Textbook: Design of Reinforced Concrete, by Jack C. McCormac and Russel H. Brown, Ninth Edition, Wiley, 2014, ISBN 978-1-118-12984-5

Reference Optional: "Building Code Requirements for Reinforced Concrete," (ACI 318-05), and commentary, American Concrete Institute, Farmington Hills, MI.

Topics Covered	Learning Outcomes
Analyzing reinforced concrete beams under service loads and ultimate loads.	Students will be able to understand, analyze and design the following: 1. Material properties 2. Analyze for service loads 3. Deflections; control of cracking 4. Analyze for strength 5. Design for strength 6. Design for shear 7. Anchorage and bond 8. Analyze and design of short columns 9. Understand the characteristics of reinforced concrete materials 10. Evaluate stresses and deflections of beams at service load. 11. Determine the capacity of beam sections at ultimate load.
Learning to design beam sections for demanded flexural strength and shear strength.	12. Proportion economical beams in reinforced concrete for ultimate loads considering rectangular sections, sections with compression reinforcement and sections with flanges." 13. The concepts of the balanced section and of curvature ductility. 14. Select size and spacing of reinforcement for ultimate shear considering the effect of moments and axial loads acting on the section. 15. Identify regions of beams where the flexural reinforcement and shear reinforcement can be reduced. 16. Determine anchorage lengths required to develop the strength of reinforcing and the use of hooked bars.

Analyzing and designing short columns	17. Select section and reinforcement for columns subjected to axial loads. 18. Develop interaction diagrams for columns subjected to axial load and moment 19. Design sections for axial load and moment 20. Design spiral reinforcement and locate plastic centroid

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Lecture and Lab Schedule			
Lecture		**Lab**	
Sessions per Week	Duration per Session	Sessions per Week	Duration per Session
2	1.5 hours	n/a	

Relation of Course Objectives to Program Outcomes

The Civil Engineering program is designed to teach beyond the technical content of the curriculum and prepare the students to utilize what they learn in a professional setting.

This course does not contributes to the program outcomes.

Course Contribution to Program Outcomes *(a-k)*	✓ Key
N/A	

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