

<b>CE 370</b> <b>Reinforced Concrete Design I</b>	
<b>Department of Civil Engineering</b> <b>King Saud University</b>	
<b>Course Description:</b> <b>CE 370 Reinforced Concrete Design I</b> (Required for BSCE degree)	1. Introduction to reinforced concrete and building codes. 2. Limit states and design philosophy. 3. Flexural behavior of reinforced concrete beams. 4. Analysis and design of beams for flexure and shear in accordance with SBC. Bond and development length of reinforcing bars, 5. Analysis and design of continuous beams and one-way slabs. 6. Analysis and design of short columns and 7. Analysis and design of spread footings. <b>4(4,1,0)</b>
<b>Prerequisite</b>	<b>CE 306</b> (Properties and Testing of Structural Materials), <b>CE 360</b> (Structural Analysis I) Prerequisite by Topics: <ol style="list-style-type: none"> <li>1. Mechanical behavior of concrete and steel,</li> <li>2. Drawing shear force and bending moment diagrams in beams,</li> <li>3. Determination of bending and shear stresses in beams,</li> <li>4. Computation of elastic deflections in beams.</li> </ol>
<b>Course Learning Outcomes CLO</b>	Students completing this course successfully will be able to: <ol style="list-style-type: none"> <li>1. Analyze and design RC beams for flexure and shear.</li> <li>2. Compute tensile and compressive bar development lengths.</li> <li>3. Analyze and design continuous beams and one way slabs.</li> <li>4. Analyze and design RC short columns.</li> <li>5. Analyze and design RC spread footings.</li> </ol>
<b>Topics Covered</b>	1. Introduction, reinforced concrete and building codes, limit states and design process, structural safety, loading and actions <b>(3 hours)</b> . 2. Materials, concrete strength, stress-strain relationship, durability of concrete, steel reinforcement <b>(3 hours)</b> . 3. Flexural behavior of reinforced concrete beams, analysis and design of rectangular beams <b>(9 hours)</b> . 4. Analysis and design of T-beams and beams with compression reinforcement <b>(8 hours)</b> . 5. Analysis and design of reinforced concrete beams for shear <b>7 hours)</b> . 6. Bond, development length of reinforcement <b>(6 hours)</b> . 7. Analysis and design of continuous beams and one way slabs <b>(9 hours)</b> . 8. Analysis and design of short columns <b>(8 hours)</b> . 9. Design of spread footings <b>(3 hours)</b> .
<b>Class/ tutorial Schedule</b>	Class is held <b>four times</b> per week in <b>50-minute</b> lecture sessions. There is also <b>a 50-minute</b> weekly tutorial associated with this course
<b>Computer Applications</b>	Excel and RC-Software Programs are encouraged to be used during the course.
<b>Contribution of Course to Meeting the Professional Component</b>	1. Students use latest codes for designing structural members and systems within appropriate constraints. 2. Students recognize the role of professional societies in developing codes and standards and updating current knowledge.
<b>Relationship of Course to Program Outcomes</b>	1. Students apply knowledge in mathematics, and principles of mechanics. 2. Students use and comply with professional code provisions to achieve safe structural design.

	<ol style="list-style-type: none"> <li>3. Students are encouraged to carry out design in an efficient and professional way, and are able to use alternate design solutions</li> <li>4. Students realize the importance of computers in the design process.</li> <li>5. Students are able to familiarize themselves with the new developments in techniques, materials, codes and specifications.</li> <li>6. Students recognize the importance of accurate structural analysis in designing structural components.</li> <li>7. Students recognize their role with an engineering team carrying other aspects for designing structures, in terms of choosing the structural systems and the interaction of decisions made by various architectural and engineering teams.</li> <li>8. Students recognize the importance of reading and understanding technical contents in English in order to achieve life-long learning and be able to carryout their responsibilities.</li> <li>9. Students are encouraged to improve their writing, communication and presentation skills.</li> </ol>
<b>Textbook(s) and/or Other Required Material</b>	<ol style="list-style-type: none"> <li>1. Reinforced Concrete: Mechanics and Design, Latest Edition by James K. White, Pearson.</li> <li>2. The Saudi Building Code (SBC 301), “Design Loads for Buildings and Structures”, 2018.</li> <li>3. The Saudi Building Code (SBC 304), “Concrete Structures”, 2018.</li> </ol>
<b>Additional references</b>	<ol style="list-style-type: none"> <li>1. Design of Reinforced Concrete, 10<sup>th</sup> Edition by J. C. McCormac and R. H. Brown, Wiley, USA.</li> <li>2. Design of Concrete Structures, 15<sup>th</sup> Edition by David Darwin, Charles W. Dolan, and A. H. Nilson, McGraw-Hill, USA</li> </ol>
<b>Grade Distribution</b>	<p>First Mid-Term Exam: <b>25%</b></p> <p>Monday: <b>25/02/1442 H, (12/10/2020)</b>, 6:30-8:30 pm</p> <p>Second Mid-Term Exam: <b>25%</b></p> <p>Wednesday: <b>3/04/1442 H, (18/11/2020)</b>, 6:30-8:30 pm</p> <p>Homeworks and Quizzes: <b>10%</b></p> <p>Final Exam: <b>40%</b></p>