


College of Engineering Department of Civil Engineering		
<h2>CE 306 Properties and Testing of Structural Materials</h2>		
Credit and Contact hours	3/ 2(Lectures), 0 (Tutorials), 2 (Laboratory)	
Required, or Elective	Required for a BSCE degree	
Course Description	General properties, testing and specifications of engineering materials. Stress-strain behavior of concrete and reinforcing bars. Properties and testing of concrete making materials (cement, aggregates, mixing water and admixtures). Requirements and design of concrete mixes. Mixing, placing and curing of concrete. Quality control and statistical evaluation.	
Prerequisites or Co-requisites	CE 302 (Mechanics of Materials)	
Course Learning Outcomes	Students completing this course successfully will be able to	
	Course Learning Outcomes	<i>Related Student Outcomes (SO)</i>
	CLO1. Investigate mechanical properties of steel and concrete using relevant standard tests to draw conclusions about quality and compliance with standard specifications.	SO6
	CLO2. Investigate properties of concrete constituents (cement, water and aggregates) using appropriate tests according to related standards and specifications to draw conclusions about quality and suitability for concrete manufacturing.	SO6
	CLO3. Develop different normal concrete mixtures that satisfies certain properties related to workability, strength and durability with the consideration of environmental and economic aspects.	SO2
CLO4. Investigate different stages of concrete manufacturing including batching, mixing, transporting, placing, and curing of concrete, and assess its effects on quality of concrete mixtures.	SO2	
Student Outcomes related to this Course	SO2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare,	

	<p>as well as global, cultural, social, environmental, and economic factors [ABET 2]</p> <p>SO6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. [ABET 6]</p>																						
Topics Covered	<table border="1"> <thead> <tr> <th>List of Topics</th> <th>Related CLOs</th> </tr> </thead> <tbody> <tr> <td>1. Introduction, properties and testing of engineering materials</td> <td>CLO1</td> </tr> <tr> <td>2. Mechanical behavior of steel and concrete (stress-strain diagram)</td> <td>CLO1</td> </tr> <tr> <td>3. Standards and specifications related to civil engineering materials</td> <td>CLO1</td> </tr> <tr> <td>4. Portland Cements: Manufacture, Chemical composition, Types, physical properties, Special cements</td> <td>CLO2</td> </tr> <tr> <td>5. Aggregates: Types, grading, properties and quality tests</td> <td>CLO2</td> </tr> <tr> <td>6. Mixing Water for Concrete</td> <td>CLO2</td> </tr> <tr> <td>7. Workability of Concrete</td> <td>CLO3</td> </tr> <tr> <td>8. Introduction to admixtures with the consideration of environmental and economic aspects</td> <td>CLO3</td> </tr> <tr> <td>9. Proportioning Normal Concrete Mixtures: Selecting Mix Characteristics (strength, durability, water-cement ratio, Aggregates, Cement content, Slump) and example of mixture proportioning.</td> <td>CLO3</td> </tr> <tr> <td>10. Examine different stages of concrete manufacturing including batching, mixing, transporting, placing, and curing of concrete, and assess its effects on quality of concrete.</td> <td>CLO4</td> </tr> </tbody> </table>	List of Topics	Related CLOs	1. Introduction, properties and testing of engineering materials	CLO1	2. Mechanical behavior of steel and concrete (stress-strain diagram)	CLO1	3. Standards and specifications related to civil engineering materials	CLO1	4. Portland Cements: Manufacture, Chemical composition, Types, physical properties, Special cements	CLO2	5. Aggregates: Types, grading, properties and quality tests	CLO2	6. Mixing Water for Concrete	CLO2	7. Workability of Concrete	CLO3	8. Introduction to admixtures with the consideration of environmental and economic aspects	CLO3	9. Proportioning Normal Concrete Mixtures: Selecting Mix Characteristics (strength, durability, water-cement ratio, Aggregates, Cement content, Slump) and example of mixture proportioning.	CLO3	10. Examine different stages of concrete manufacturing including batching, mixing, transporting, placing, and curing of concrete, and assess its effects on quality of concrete.	CLO4
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Textbook(s) and Other Required Material	Steven H. Kosmatka and Michelle L. Wilson. Design and control of concrete mixtures, 16 th Edition, Portland Cement Association Skokie, IL.																						
Grading System	<p>Two Mid-term Exams 48 %</p> <p>Lab Reports and attendance 12%</p> <p>Final Exam: 40%</p>																						
Instructors	<p>Prof. Abdulrahman Alhozaimy (2A62), email; alhozimy@ksu.edu.sa</p> <p>Prof. Abdulaziz Al-Negheimish (2A74), email; negaimsh@ksu.edu.sa</p> <p>Dr. Fahed Alrshoudi (2A41), email; farshoudi@ksu.edu.sa</p>																						
Date of Review	November, 2020																						