


College of Engineering			
Department of Civil Engineering			
<b>CE 431 Highway Engineering</b>			
<b>Credit and Contact hours</b>	3 / 3 (Lectures), 1 (Tutorials), 0 (Laboratory)		
<b>Required, or Elective</b>	Required for a BSCE degree		
<b>Course Description</b>	Introduction, Highway Travel Characteristics, Economic Analysis of Highways, Highway and the Environment, Highway Surveys and Plans, Geometric Design of Highway, Intersections and Interchanges, Pavement Structural Design, Pavement Evaluation and Maintenance.		
<b>Prerequisites or Co-requisites</b>	<b>Pre-requisites:</b> Transportation Systems (CE 430) and Geotechnical Engineering-I (382) <b>Co-requisites:</b> Highway Laboratory (CE432)		
<b>Course Learning Outcomes</b>	Students completing this course successfully will be able to		
	<b>Course Learning Outcomes</b>		<b>Related Student Outcomes (SO)</b>
	<b>CLO1.</b> Identify different Characteristics of Highway Travel elements: Driver, Vehicle and Traffic; and Highway Surveys and Plans.		<b>SO1</b>
	<b>CLO2.</b> Design Highway Geometric Elements: Sight Distances, Horizontal and Vertical Alignments, Cross Section Elements, and Intersections, with the consideration of safety, environmental and economic factors.		<b>SO2</b>
<b>CLO3.</b> Design pavements with different material properties for different conditions and set maintenance strategies and plans, with the consideration of safety, environmental and economic factors.		<b>SO2</b>	
<b>Student Outcomes related to this Course</b>	<b>SO1.</b> An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics and using modern engineering tools. [ABET 1]  <b>SO2.</b> an ability to apply <b>engineering design</b> to produce solutions that meet specified needs with consideration of <b>public health, safety, and welfare</b> , as well as <b>global, cultural, social, environmental, and economic factors</b> . [ABET 2]		

<b>Topics Covered</b>	<b>List of Topics</b>		<b>Related CLOs</b>						
	1. Introduction: Highway System Development, Highway Functional Classifications, Highway Organizations and Associations.	CLO1							
	2. Highway Travel Characteristics: Driver, Vehicle and Traffic.	CLO1							
	3. Economic Analysis of Highways: Highway Transportation Costs, Methods of Economic Analysis.	CLO2							
	4. Highway and the Environment: Environment Impact Condition, Pollution.	CLO2							
	5. Highway Geometric Design; Sight Distances, Horizontal and Vertical Alignments, Cross Section Elements.	CLO2							
	6. Highway Surveys and Plans: Highway routes Location, Highway Plans.	CLO1							
	7. Interchanges and Intersection.	CLO2							
	8. Highway material properties.	CLO3							
	9. Pavement Structural Design: Principles, Methods.	CLO3							
	10. Pavement Evaluation and Maintenance.	CLO3							
<b>Textbook(s) and Other Required Material</b>	<ol style="list-style-type: none"> <li>1. Highway Engineering, 7th Edition, (2004), by Paul H. Wright &amp; Karen Dixon</li> <li>2. Mix Design Methods for Asphalt Concrete and other Hot-Mix Types. Asphalt Institute, MS-2, 1994.</li> <li>3. Thickness Design - Asphalt Pavement for Highways and Streets, Asphalt Institute, MS-1, 1991.</li> <li>4. AASHTO Guide for Design of Pavement Structure, 1993</li> </ol>								
<b>Grading System</b>	<table border="0"> <tr> <td>Two Mid-term exams</td> <td>50 %</td> </tr> <tr> <td>Quizzes</td> <td>10%</td> </tr> <tr> <td>Final Exam:</td> <td>40%</td> </tr> </table>			Two Mid-term exams	50 %	Quizzes	10%	Final Exam:	40%
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<b>Instructors</b>	Prof. Abdulrahman Al-Suhaibani (2A43/2), Email: <a href="mailto:asuhaib@ksu.edu.sa">asuhaib@ksu.edu.sa</a> , Prof. Abdullah Al-Mansour (2A66), Email: <a href="mailto:amansour@ksu.edu.sa">amansour@ksu.edu.sa</a> .								
<b>Date of Review</b>	October, 2020								