

<b>CE431 HIGHWAY ENGINEERING</b>	
<b>Department of Civil engineering King Saud University</b>	
Course Description CE431 Highway Engineering (Required for a B.Sc.E degree)	Highway planning and evaluation, Design controls and criteria, Cross-sectional elements, Sight distances, Horizontal and vertical alignments, Intersections, Highway materials characterization, Highway drainage, and Pavement evaluation and maintenance [ 3(3,1,0)]
Prerequisite	CE430 - Introduction to Transportation Systems CE381 - Engineering properties of Soils and their Measurements 1. Understand transportation types and modes. 2. Understand traffic fundamentals and theories. 3. Understand urban transportation planning process. 4. Understand the role of transportation in society development. 5. Understand engineering properties of soil. 6. Understand soil classification systems. 7. Understand the methods of soil testing.
Course learning objectives	Upon successful completion, the student will be able to: 1. Understand Highway Evaluation: Highway transportation costs, Methods of economic analysis, and contemporary issues related to environmental impacts of highways. 2. Understand Highway Travel Characteristics: Drivers, Vehicle and contemporary issues related to highway traffic accidents. 3. Design of Highway Geometric Elements: Sight distances, Horizontal and vertical alignments, Cross-section elements, and Intersections and interchanges. 4. Understand Highway Surveys and Plans: Highway rout location and highway plans.
Topics covered	1. Introduction: Highway system development, highway functional classifications, Highway organizations and associations. 2. Highway Evaluation: Economic analysis of highways, Highway transportation costs, Methods of economic analysis, Noise and air pollution, and Contemporary issues related to the impact of highway on the environment. 3. Highway Travel Characteristics: Driver, Vehicle, and Contemporary issues related to highway accidents. 4. Highway Geometric Design: Sight distances, Horizontal and vertical alignments, and Intersections and interchanges. 5. Highway Surveys and Plans: Highway route location and highway plans. 6. Pavement Structural Design: Principles and methods.
Class/tutorial schedule	Class is two times per week in 50-minute lecture sessions. Tutorial is held one time per week in 50-minutes sessions
Computer applications	Road Geometric Design Software
Project	Mini project – Hands on Road Geometric Design Software
Contribution of course to meeting the professional component	1. Students learn the analysis process to be involved in designing various highway components used in professional highway engineering. 2. Students recognize the role of professional societies in developing codes and standards as well as updating current knowledge.
Relationship of Course to Program Outcomes	1. Student apply algebra, elementary calculus, and principles of mechanics. 2. Students are able to identify and formulate an engineering problem and to develop solution.

	<ol style="list-style-type: none"> <li>3. Students recognize the importance of the analysis in designing highway components.</li> <li>4. Students are encouraged to submit accurate analysis in an efficient and professional way.</li> <li>5. Students recognize their role with an engineering team carrying other aspects for analysing structures, in terms of choosing highway systems and the interaction of decisions made by various engineering teams.</li> <li>6. Students are encouraged to recognize the different highway and pavement systems and their range of applications.</li> <li>7. Students recognize the ethical and professional responsibility in achieving accurate analysis for safe and economical design, and its impact on the well-being of the society.</li> <li>8. Students recognize the need for technical updating on continuing basis, since the course emphasizes on the changing nature of software, codes, and specifications.</li> <li>9. Students recognize the importance of reading and understanding technical contents in English in order to achieve life-long learning and be able to carry out their responsibilities.</li> <li>10. Students recognize the important role of computers in facilitating analysis and design of highway systems.</li> </ol>
Textbook(s) and/or other required material	<ol style="list-style-type: none"> <li>1. Highway Engineering, 7<sup>th</sup> Edition, (2004), Paul H. Wright and Karen Dixon.</li> <li>2. Highway Engineering (1981), Oglesby, C. And Hicks, R., published by John Wiley &amp; Sons.</li> <li>3. Asphalt Pavement Engineering (1967), Wallace, H. And Martin, J., Published by McGraw-hill.</li> <li>4. Principles of Pavement Design (1975), Yoder and Witczak, published by John Wiley &amp; Sons</li> <li>5. A policy on Geometric Design of Highway and Streets (1993), AASHTO.</li> <li>6. Thickness Design (1991) – Asphalt Pavement for Highways and Streets, Asphalt Institute, MS-1.</li> <li>7. Class Notes and Handouts.</li> </ol>
Prepared by	Dr. Walied A. Elsaigh

### Grade Distribution

Description	Percentage	Dates and Times
Attendance*	5	
Quizzes	15	
1 <sup>st</sup> Mid-term	20	23-Rabi II-1434H 18:30 after Magrib (Tuesday)
2 <sup>nd</sup> Mid-term	20	13-Jumada II-1434H 19:00 after Magrib (Tuesday)
Final Exam	40	

\*Attendance is crucial and shall be made on time

### Consultation Times and Contact Details

Day	Time	Address
Saturday	1:00 - 3:00	Civil Engineering Department
Sunday	8:00 - 9:00	Office No. 2A - 36
Monday	8:00 - 9:00& 1:00-3:00	<a href="mailto:welsaigh@ksu.edu.sa">welsaigh@ksu.edu.sa</a>
Wednesday	8:00 - 9:00& 1:00-2:00	<a href="http://fac.ksu.edu.sa/welsaigh">http://fac.ksu.edu.sa/welsaigh</a>