

Academic Year: 2023-2024		Semester: Spring		Starting Date: 18-2-2024	
Course Name	Pavement Design				
Module Language	English				
Instructor	Asst. Prof. Dr. Abdulhakim O. Salih Kozapanky				
Teaching Assistance(s)	None				
College/University	College of Engineering – Salahaddin University-Erbil				
Department	Civil				
Semester Duration	15 weeks				
Course Overview	<p>During the past century, highway transportation has evolved from the “out of the mud” era to one in which a network of highways provides multiple levels of service from uncontrolled to controlled access. Highway pavements are divided into two main categories: rigid and flexible. Flexible pavements are further divided into three subgroups: high type, intermediate type and low type. The surface of the roadway should be stable and non-yielding, to allow the heavy wheel loads of road traffic to move with least possible rolling resistance. Also should be even along the longitudinal profile to enable the fast vehicles to move safely and comfortably at the design speed. Therefore in order to provide a stable and even surface for the traffic, the roadway is provided with a suitably designed and constructed pavement structure. Thus a pavement consisting of a few layers of pavement materials is constructed over a prepared soil subgrade to serve as a carriageway and sustain a large number of repeated load applications during the design life.</p> <p>Pavement design is the process of developing the most economical combination of pavement layers with respect to both material type and thickness to suit the soil foundation and the traffic load during the design period. Also it is a complex process that requires the designer to analyze data and information from many sources. It is imperative that the designer examine data and design calculations for reasonableness. There are different methods for the design of pavement structures. AASHTO design procedure is one of the approved design methods recognized globally also there are many other methods recognized.</p>				
Course Objectives	<p>The objective of this course is to provide students with an understanding of the important problems associated with Pavement Design: Pavement Behavior under Moving Loads, Vehicle &amp; Traffic Factors in Pavement Design, Material Characterization with different tests required, Pavement Deformation &amp; Design Approaches, Design of Flexible Airfield Pavements by different methods, Approaches to Highway Flexible Pavement Design: AASHTO &amp; other methods, Rigid Highway &amp; Airfield Pavements: Joints in Cement Concrete Pavements, Recommendations for Design of Highway Cement Concrete Pavements, Pavement Evaluation &amp; Rehabilitation.</p>				
Course Contents	Week	Lecture			
	1 <sup>st</sup>	Introduction			
	2 <sup>nd</sup>	Vehicle and Traffic Factors in Pavement Design			
	3 <sup>rd</sup>	Equivalent Wheel Load Factor (EWLF)			
	4 <sup>th</sup>	Material Characterization			
	5 <sup>th</sup>	Split Cylinder Test or Indirect Tensile Test			
	6 <sup>th</sup>	Pavement Deformation			
	7 <sup>th</sup>	Design of Flexible Airfield Pavements			
	8 <sup>th</sup>	Midterm Exam.			
	9 <sup>th</sup>	Canadian Department of Transportation(CBoT) Method[McLeods Method]			
	10 <sup>th</sup>	Approaches to Highway Flexible Pavement Design			
	11 <sup>th</sup>	Rigid Highway and Airfield Pavements			
	12 <sup>th</sup>	Recommendations for Design of Highway Cement Concrete Pavements			
	13 <sup>th</sup>	Pavement Evaluation and Rehabilitation			
	14 <sup>th</sup>	Seminar Presentations			
	15 <sup>th</sup>	Final Examination			

<p><b>Textbooks and References</b></p>	<ol style="list-style-type: none"> <li>1. Principles of Pavement Design, Yoder, [Text Book]</li> <li>2. AASHTO Material: Part 1: Specifications, Part 2: Tests.</li> <li>3. SORB: Standard Specifications of Roads &amp; Bridges, Iraq.</li> <li>4. Highway Engineering Hand Book, by: Woods</li> <li>5. Asphalt Pavement Engineering, Theory&amp; Practice, by: Wallace&amp; Martin.</li> <li>6. Soil Mechanics for Road Engineers, TRRL.</li> <li>7. Highway Materials, by: Krebs</li> <li>8. The Design &amp; Performance of Road Pavement, by: Groney</li> <li>9. Development in Highway Pavement Engineering, by: Pell.</li> <li>10. Bituminous Road Construction, Hand Book, by: K.P.Nair.et.al.</li> <li>11. Pavement Analysis&amp; Design, by: Yang H.Huang</li> <li>12. Prediction of Moisture Content of Road Subgrades (OECD), Paris.</li> <li>13. Internet (for various update references).</li> </ol>
<p><b>Teaching Style</b></p>	<p>3 hrs. Theory in Class</p>
<p><b>Requirements for Credit Points</b></p>	<p>For the award of credit points, it is necessary to pass the module exam. It contains: <b>An examination during the academic semester, Quizzes, Assignments, and Final Examination. Student's attendance is required in all classes.</b></p>
<p><b>Credit ECTS</b></p>	<p><b>6</b></p>
<p><b>Grade Distribution</b></p>	<p>The following grade system is used for the evaluation of the module exam:  The module exam is based on the summation of two categories of evaluations:  <b>First: (50%)</b> of the mark is based on the academic semester effort which includes:</p> <ul style="list-style-type: none"> <li>- Midterm Exam = <b>20%</b>.</li> <li>- Quizzes = <b>5%</b></li> <li>- Seminar = <b>10%</b></li> <li>- Review Article = <b>15%</b></li> </ul> <p><b>Second: (50%)</b> of the mark is based on the Final Examination that is comprehensive for the whole of the study materials reviewed during the academic semester.</p>
<p><b>Workload</b></p>	<p>Workload 10hrs/w (150hrs/s): Contact face-to-face 3hrs/w (45hrs/s) and Non-Contact Self learning 7hrs/w (105hrs/s)</p>