

<b>Module Information</b> معلومات المادة الدراسية			
<b>Module Title</b>	<b>Highway pavement engineering</b>	<b>Module Delivery</b>	
<b>Module Type</b>	<b>Core</b>	<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical	
<b>Module Code</b>	<b>UOMU0203056</b>		
<b>ECTS Credits</b>	<b>4</b>		
<b>SWL (hr/sem)</b>	<b>100</b>		
<b>Module Level</b>	<b>UGIII</b>	<b>Semester of Delivery</b>	<b>5</b>
<b>Administering Department</b>	<b>Building and Construction Techniques Engineering</b>	<b>College</b>	<b>Al-Mustaqbal university</b>
<b>Module Leader</b>	<b>Tameem M. Hashim</b>	<b>e-mail</b>	<b>tameemmohammed@uomus.edu.iq</b>
<b>Module Leader's Acad. Title</b>	<b>Senior Lecture</b>	<b>Module Leader's Qualification</b>	<b>MSc.in Civil Engineering /Road and Transportation</b>
<b>Module Tutor</b>		<b>e-mail</b>	
<b>Peer Reviewer Name</b>		<b>e-mail</b>	
<b>Scientific Committee Approval Date</b>		<b>Version Number</b>	

<b>Relation with other Modules</b> العلاقة مع المواد الدراسية الأخرى			
<b>Prerequisite module</b>	<b>None</b>	<b>Semester</b>	
<b>Co-requisites module</b>	<b>None</b>	<b>Semester</b>	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"><li>1. This course aims to provide a good understanding to hot mixtures asphalt design and properties of asphalt materials.</li><li>2. To prepare them to carry out experimental investigation and analysis at later stages of graduation.</li><li>3. To provide suitable information about construction of flexible and rigid pavement.</li><li>4. To provide good information about railway and airport engineering.</li></ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>upon completion of this course the students will:</p> <ol style="list-style-type: none"><li>11- To apply the knowledge of asphalt materials and their tests.</li><li>12- To identify methods of hot mixture asphalt design.</li><li>13- To classify subgrade materials by AASHTO, USCS.</li><li>14- To examine the specification of Asphalt mixture 171</li><li>15- Selecting the appropriate materials for use in different road layers.</li><li>16- To evaluate the quality and performance of unbound and bound road materials.</li><li>17- Perform road pavement design and analysis classify mass movements, describe factors causing mass movements and propose.</li><li>18- Analyze and design various earth retaining structures for internal and external stability.</li><li>19- Identify the reason for real field slope and retaining wall failures and propose measures to mitigate such failures in the future.</li><li>20- To learn about railway and airport engineering.</li></ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Asphalt materials and tests. [6hrs]</p> <p>Sub-grade works , grading , cut and fill sections , soil classification ( AASHTO , UCS ) , Leveling and compactions [3hrs]</p> <p>Sub-base works, stockpiles, specifications, spreading, leveling and compactions. [3hrs]</p> <p>Base works, macadam and untreated base, stabilized base ( bitumen , lime , cement treated base ) . [6hrs]</p> <p>Prime and tack coats, specifications and applications. [3hrs]</p> <p>Asphalt plants ( types and units ) , crushers. [3hrs]</p> <p>Asphalt mixtures ( Hot and Cold) , specifications. [3hrs]</p> <p>Asphalt pavement constructions, placing, spreading, pavers, rollers, field tests, leveling and thickness controlling.[6hrs]</p> <p>Rigid pavement, layers, fixed and slip forms, joints and reinforcing, control of</p>

	leveling, and finishing. [6hrs] Railway cross section, embankment specification, Airport orientation , runway and taxiway specification[3hrs]
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم			
<b>Strategies</b>	Assessment is based on 1- Exams. 2- Student feedback. 3- Seminars. 4- Reports in Lab.		
<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	63	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	100		

<b>Module Evaluation</b> تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	<b>Assignments</b>	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	<b>Projects / Pract.</b>	1	10% (10)	Continuous	
	<b>Report</b>	1	10% (10)	13	LO # 5, 8 and 10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	7	LO # 1-7
	<b>Final Exam</b>	4hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1 & 2	Asphalt materials and tests.
Week 3	Sub-grade works , grading , cut and fill sections , soil classification ( AASHTO , UCS ) , Leveling and compactions
Week 4	Sub-base works , stockpiles , specifications , spreading , leveling and compactions
Week 5 & 6	Base works, macadam and untreated base , stabilized base ( bitumen , lime , cement treated base ).
Week 7	Prime and tack coats, specifications and applications.
Week 8	Asphalt plants ( types and units ) , crushers.
Week 9	Asphalt mixtures ( Hot and Cold) , specifications.
Week 10 & 11	Asphalt pavement constructions, placing, spreading, pavers, rollers, field tests, leveling and thickness controlling.
Week 12 & 13	Rigid pavement, layers, fixed and slip forms, joints and reinforcing, control of leveling, and finishing.
Week 14	Railway cross section, embankment specification, Airport orientation , runway and taxiway specification
Week 15	<b>Preparatory week before the final Exam</b>

### Delivery Plan (Weekly Practical. Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1 & 2	Ductility of Bitumen
Week 3 & 4	Thin Film Oven Test
Week 5 & 6 & 7	Aging Test of Bitumen
Week 8 & 9	Marshall Mix Design
Week 10 & 11	Stability Test of HMA Mixture

<b>Week 12 &amp; 13</b>	Flow Test of HMA Mixture
<b>Week 14 &amp; 15</b>	Air Voids Test of HMA Mixture

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>		Yes
<b>Recommended Texts</b>	<p>8. Pavement Engineering Principles And Practice By Rajib B. Mallick And Tahar El-Korchi, 2 Nd Edition, 2013.</p> <p>9. A Policy On Geometric Design Of Highway And Streets, The Green Book, 6<sup>th</sup> Edition, 2011.</p> <p>10. Principles of Highway Engineering And Traffic Analysis, Fred L. Mannering And Scott S. Washburn,5 Edition,2012</p> <p>11. Transportation Infrastructure Engineering A Multimodal Integration SI Edition, 2011, Lester A. Hoel, Nicholas J. Garber And Adel W. S Adek.</p> <p>12. Traffic &amp; Highway Engineering - Garber &amp; Hoel 2009</p> <p>13. The_Handbook_of_Highway_engineering.</p> <p>14. Pavement Analysis and Design by Yang H Huang - www- By EasyEngineering.net</p> <p>15. Road design manual / 2007</p> <p>16. A Policy on geometric design of highway and streets / 2001</p> <p>17. The handbook of highway engineering / 2006</p> <p>18. Super pave fundamentals , FHWA , NHI # 131053</p> <p>19. Internet's references.</p>	No
<b>Websites</b>		

## Grading Scheme

### مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.