

Module Information

معلومات المادة الدراسية

| Module Title | Pavement Engineering | | | Module Delivery | |
|------------------------------------|--|-------------------------------|---|--|--|
| Module Type | Core | | | <input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar | |
| Module Code | UOMU023056 | | | | |
| ECTS Credits | 4 | | | | |
| SWL (hr/sem) | 100 | | | | |
| Module Level | UGIII | Semester of Delivery | 5 | | |
| Administering Department | Building and Construction Techniques Engineering | College | Al-Mustaqlbal university | | |
| Module Leader | Tameem M. Hashim | e-mail | tameemmohammed@uomus.edu.iq | | |
| Module Leader's Acad. Title | Senior Lecture | Module Leader's Qualification | MSc.in Civil Engineering /Road and Transportation | | |
| Module Tutor | | e-mail | | | |
| Peer Reviewer Name | | e-mail | | | |
| Scientific Committee Approval Date | | Version Number | | | |

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

| | | | |
|----------------------|------|----------|--|
| Prerequisite module | None | Semester | |
| Co-requisites module | None | Semester | |

| Module Aims, Learning Outcomes and Indicative Contents | |
|--|--|
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
| Module Aims أهداف المادة الدراسية | 1. This course aims to provide a good understanding to highway design to understand, roadway classification, pavements types 2. To prepare them to carry out practical investigation and analysis at later stages of graduation. |
| Module Learning Outcomes مخرجات التعلم للمادة الدراسية | upon completion of this course the students will: 1- To apply the knowledge of horizontal and vertical curves. 2- To identify sight distance for different types of curves. 3- To learn superelevation on horizontal curve. 4- To learn the method of design the rigid and flexible pavement. 5- To identify AADT, ADT and DHV 6- Perform road pavement design and analysis classifies mass movements, describe factors causing mass movements and propose. 7- Analyze and design various earth retaining structures for internal and external stability. 8- Identify the reason for real field slope and retaining wall failures and propose measures to mitigate such failures in the future. 9- To learn about drainage systems, culverts, siphon, ditches and filters. 10- To learn about highway furniture and control devices |
| Indicative Contents المحتويات الإرشادية | Indicative content includes the following. Highways classification according their function, locations and pavements types [3hrs] Highway alignments and alternatives, points of inflections, topography terrain maps, cross-section elements, profiles, and horizontal and vertical curves [3hrs] Horizontal curve, angle of inflection. [3hrs] Super elevation concepts. [3hrs] Vertical curves, crest and sag curves, under crossing clear distance, minimum length and grades. [3hrs] Sight distances, stopping and passing, at grade intersection, at vertical curves, relation between length of curve and required sight distance and between middle ordinate distances. [3hrs] Traffic volumes, counting, traffic volume correction factors, level of service (LOS) , AADT, ADT , DHV. [3hrs] Traffic loads, equivalent single axle load (ESALs), tandem axle load, load damage factor, growth factor, and stresses on pavements. [3hrs] Design of flexible pavement, pavement layers[2hrs] |

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|--|--|
| | <p>Examples for design of flexible pavement[3hrs]</p> <p>Design of rigid pavement, pavement layers, chart for design[3hrs]</p> <p>Examples for design of the rigid pavement[3hrs]</p> <p>Drainage systems , culverts , siphon , ditches and filters [2hrs]</p> <p>Highway furniture and control devices [3hrs]</p> |
|--|--|

| <h3 style="text-align: center;">Learning and Teaching Strategies</h3> <h4 style="text-align: center;">استراتيجيات التعلم والتعليم</h4> | | | | | | | | |
|--|---|---|------|--|--|--|--|--|
| Strategies | <p>Assessment is based on</p> <ol style="list-style-type: none"> 1- Exams. 2- Student feedback. 3- Seminars. 4- Reports in Lab. | | | | | | | |
| Student Workload (SWL) | | | | | | | | |
| الحمل الدراسي للطالب | | | | | | | | |
| Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل | 63 | Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا | 4.21 | | | | | |
| Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل | 37 | Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا | 2.21 | | | | | |
| Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل | 100 | | | | | | | |

| <h3 style="text-align: center;">Module Evaluation</h3> <h4 style="text-align: center;">تقييم المادة الدراسية</h4> | | | | | |
|---|-------------------|-------------|------------------|------------|---------------------------|
| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
| Formative assessment | Quizzes | 2 | 10% (10) | 5, 10 | LO #1, 2, 10 and 11 |
| | Assignments | 2 | 10% (10) | 2, 12 | LO # 3, 4, 6 and 7 |
| | Projects / Pract. | 1 | 10% (10) | Continuous | |
| | Report | 1 | 10% (10) | 13 | LO # 5, 8 and 10 |
| Summative assessment | Midterm Exam | 2 hr | 10% (10) | 7 | LO # 1-7 |
| | Final Exam | 4hr | 50% (50) | 16 | All |
| Total assessment | | | 100% (100 Marks) | | |

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

| | Material Covered |
|----------------|---|
| Week 1 | Highways classification according their function, locations and pavements types |
| Week 2 | Highway alignments and alternatives, points of inflections, topography terrain maps, cross-section elements, profiles, and horizontal and vertical curves. |
| Week 3 | Horizontal curve, angle of inflection. |
| Week 4 | Super elevation concepts. |
| Week 5 | Vertical curves, crest and sag curves , under crossing clear distance , minimum length and grades. |
| Week 6 | Sight distances, stopping and passing, at grade intersection, at vertical curves, relation between length of curve and required sight distance and between middle ordinate distances. |
| Week 7 | Traffic volumes , counting , traffic volume correction factors , level of service (LOS) , AADT, ADT , DHV |
| Week 8 | Traffic loads, equivalent single axle load (ESALs), tandem axle load, load damage factor, growth factor, and stresses on pavements. |
| Week 9 | Design of flexible pavement, pavement layers |
| Week 10 | Examples for design of flexible pavement |
| Week 11 | Design of rigid pavement, pavement layers, chart for design |
| Week 12 | Examples for design of the rigid pavement |
| Week 13 | Drainage systems , culverts , siphon , ditches and filters |
| Week 14 | Highway furniture and control devices |
| Week 15 | Preparatory week before the final Exam |
| Week 16 | Final exam |

Delivery Plan (Weekly Practical. Syllabus)

المنهاج الاسبوعي للعملي

| Material Covered | |
|------------------|---|
| Week 1 | Sieve Analysis Test |
| Week 2 | The Relationship between Dry Density and Optimum Water Content of Subbase Aggregate |
| Week 3 | Specific Gravity of Cement, Sand and Gravel |
| Week 4 | California Bearing Ratio (CBR) |
| Week 5 | Penetration of Bitumen |
| Week 6 | Flash Point of Bitumen |
| Week 7 | Softening Point of Bitumen |
| Week 8 | Ductility of Bitumen |
| Week 9 | Thin Film Oven Test |
| Week 10 | Aging Test of Bitumen |
| Week 11 | Marshall Mix Design |
| Week 12 | Stability Test of HMA Mixture |
| Week 13 | Flow Test of HMA Mixture |
| Week 14 | Air Voids Test of HMA Mixture |
| Week 15 | Solvent Extraction Test |

Learning and Teaching Resources

مصادر التعلم والتدریس

| | Text | Available in the Library? |
|--------------------------|--|---------------------------|
| Required Texts | | Yes |
| Recommended Texts | <ol style="list-style-type: none"> 1. Traffic & Highway Engineering - Garber & Hoel 2009(1) 2. The Handbook o Highway Engineering 3. Pavement Analysis and Design by Yang H Huang - www- by EasyEngineering.net 4. Pavement Engineering Principles and Practice by Rajib B. Mallick and Tahar El-Korchi, 2th Edition, 2013. | No |

| | | |
|-----------------|---|--|
| | <p>5. A Policy on Geometric Design of Highway and Streets, The Green Book, 6Th Edition, 2011.</p> <p>6. Principles of Highway Engineering and Traffic Analysis, Fred L. Mannering and Scott S. Washburn, 5th Edition, 2012</p> <p>7. Transportation Infrastructure Engineering A Multimodal Integration SI Edition, 2011, Lester A. Hoel, Nicholas J. Garber And Adel W. S Adek</p> | |
| Websites | | |

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