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|  | Ministry of Higher Education and Scientific Research - IraqUniversity of BaghdadCollege of EngineeringDepartment of Electrical Engineering |  |

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

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| **Module Information****معلومات المادة الدراسية** |
| **Module Title** | Strength of Materials  | **Module Delivery** |
| **Module Type** | B | * **Theory**
* **Lecture**
* **Tutorial**
 |
| **Module Code** | WRE201 |
| **ECTS Credits**  | 5 |
| **SWL (hr/sem)** | 125 |
| **Module Level** | UGx11 2 | **Semester of Delivery** | 3 |
| **Administering Department** | WRE |  **College** |  CENG |
| **Module Leader** | Dr. Zuhair Kadhim Jahanger |  **e-mail** | zk\_jahanger@coeng.uobaghdad.edu.iq |
| **Module Leader’s Acad. Title** | Assistant Professor | **Module Leader’s Qualification** | Ph.D. |
| **Module Tutor** | None |  **e-mail** | None |
| **Peer Reviewer Name** |  |  **e-mail** |  |
| **Review Committee Approval** |  | **Version Number** | 1.0 |

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| **Relation With Other Modules****العلاقة مع المواد الدراسية الأخرى** |
| **Prerequisite module** | WRE 101 Engineering Mechanics- StaticWRE 105 Engineering Mechanics- Dynamic | **Semester** | 12 |
| **Co-requisites module** | ------- | **Semester** |  |
| **Module Aims, Learning Outcomes and Indicative Contents****أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية** |
|  **Module Aims****أهداف المادة الدراسية** | 1. To study the basic concept of engineering mechanics and strength of materials and in material behavior.
2. To develop problem solving skills and understanding of a successful machine or structural design
3. To understand how the use of mathematical reasoning and critical thinking from the output.
4. To understand one or more than one system of units problems.
5. Encourages students to understand that practically impossible to have a successful design without the use of engineering mechanics and strength of materials.
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| **Module Learning Outcomes****مخرجات التعلم للمادة الدراسية** | 1. Recognize the description of theoretical, fundamental in strength of materials and their application.
2. Define Hoke’s law and theory of elasticity.
3. List the various terms associated with stress and strain.
4. Discuss the various properties of ductile, brittle, and rigid materials.
5. A tank or pipe carrying a fluid or gas under a pressure is subjected to tensile forces, which resist bursting, developed across longitudinal and transverse sections.
6. Summarize what is meant by a Torsion and their applications.
7. Discuss an expanded treatment of shear flow with emphasis on the application of Mohr’s circle.
8. Describe Flexural Stresses in beams by pure moment on beam.
9. Identify four methods of determining the beam deflection and their applications.
10. Discuss the Beams of two materials and their practical in engineering problems.
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| **Indicative Contents****المحتويات الإرشادية** | Indicative content includes the following.Introduction The main and basic difference is in  Engineering Mechanics we assume the bodies to be rigid but in strength of materials bodies are deformed under elastic limit or condition. So, ignoring the internal forces that may cause materials failure due to external forces. Therefore, we focus on the external forces that the body can support instead of studying the external forces and internal strength. Chapter 1 – Simple stresses– Normal stress, Shearing stress, bearing stress and Thin-walled Pressure Vessel – Simple stresses are expressed as the ratio of the applied force divided by the resisting area. Also, the exploratory section [10 hrs]Chapter 2 – Simple strains– Our main concern in the simple stress was the strength of materials, i.e., the relations between load (P) , area (A) and stress (σ). You might already be familiar with Hooke's law, which states that the force needed to compress or extend a spring is directly proportional to the distance you stretch it. Hooke's law doesn't only apply to normal forces. learn about shearing deformation, shear strain, how it occurs, where it applies, and its relationship to shear stress and modulus of elasticity in shear. [10 hrs]Chapter 3 – Torsion - Consider the deviation and application of the twisting or torsion problem only in the connection with circular solid shaft, hollow shaft and Flanged Bolt Couplings In shaft connection. [10 hrs]Chapter 4 – Shear and moment in beams - Shear and bending moment diagrams are analytical tools used in conjunction with structural analysis to help perform structural design by determining the value of shear force and bending moment at a given point of a structural element such as a beam. These can be drawn using Area moment Method and by section method. [10 hrs]Chapter 5 – Stresses in beams: Flexural formula- Internal forces is developed within it to maintained equilibrium. These Internal forces have two components. We have internal shear force oriented in the vertical direction and, we have internal normal forces which is oriented along the axis of the beam. Shear force which is resultant of the internal vertical forces and bending moment is resultant of the internal normal forces. derive the relations between the bending moment and the flexural stress it causes. Derivation of Formula for Horizontal shearing Stress.Beams of two materials. [15 hrs].Chapter 6 – Beams deflections - The deflection of the beam in a particular direction when a force is applied is called beam deflection. The beam can be bent and moved from its original position. This distance at any point along the bar represents deflection. The deformations must be kept below the permissible tolerance. [10 hrs]Chapter 7–Mohr’s circle– The graphical method of determining the relation at a point between normal and shear stresses along any inclined plane. [5 hrs] Revision problem classes [5 hrs] |
| **Learning and Teaching Strategies****استراتيجيات التعلم والتعليم** |
| **Strategies** | The main strategy that will be adopted in delivering this module is to encourage students’ participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. |

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| **Student Workload (SWL)****الحمل الدراسي للطالب** |
| **Structured SWL (h/sem)****الحمل الدراسي المنتظم للطالب خلال الفصل** | 78 | **Structured SWL (h/w)****الحمل الدراسي المنتظم للطالب أسبوعيا** | 5.2 |
| **Unstructured SWL (h/sem)****الحمل الدراسي غير المنتظم للطالب خلال الفصل** | 47 | **Unstructured SWL (h/w)****الحمل الدراسي غير المنتظم للطالب أسبوعيا** | 3.133 |
| **Total SWL (h/sem)****الحمل الدراسي الكلي للطالب خلال الفصل** | 125 |

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| **Module Evaluation****تقييم المادة الدراسية** |
| **As** | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 2 | 10% (10) | 5, 11 | LO #1, 2, 8 and 10 |
| **Assignments** | 2 | 10% (10) | 3,7,9, 14 | LO # 3, 5, 6 and 8 |
| **Projects / Lab.** | 1 | 5% (5) | Continuous |  |
| **Report** | 1 | 5% (5) | 8 & 15 | LO # 4, 5,7, 8 and 10 |
| **Summative assessment** | **Midterm Exam** | - | - | - | - |
| **Final Exam** | 3hr | 70% (70) | 16 | All |
| **Total assessment** | 100% (100 Marks) |  |  |

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| **Delivery Plan (Weekly Syllabus)****المنهاج الاسبوعي النظري** |
| **Week**  | **Material Covered** |
| **Week 1** | Simple stress-Normal stress, Shearing stress and bearing stress, Hook’s law, Young modulus of elasticity and Poisson’s ratio |
| **Week 2** | Simple stress-Thin-walled Pressure Vessel |
| **Week 3** | Simple strain- Normal strain and Shearing deformation and shear strain |
| **Week 4** | Simple strain- Statically indeterminate member |
| **Week 5** | Torsion- Solid shafts |
| **Week 6** | Torsion- Hollow circular shafts |
| **Week 7** | Shear and moment in beams- Shear and bending moment diagrams by Area method |
| **Week 8** | Shear and moment in beams- Shear and bending moment diagrams by Section method |
| **Week 9** | Stresses in beams- Centroid of the section and Moment of Inertia |
| **Week 10** | Stresses in beams-Flexural Stresses in symmetrical beam  |
| **Week 11** | Stresses in beams-Flexural Stresses in unsymmetrical beam, Derivation of Formula for Horizontal shearing Stress and Beams of two materials |
| **Week 12** | Beams deflections- Double Integration Method and Area-Moment Method |
| **Week 13** | Beams deflections- Conjugate-beam Method and Superposition Method |
| **Week 14** | Mohr’s circle- |
| **Week 15** | **Preparatory Week** |
| **Week 16** | **Final Exam** |

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| **Delivery Plan (Weekly Lab. Syllabus)****المنهاج الاسبوعي للمختبر** |
| **Week**  | **Material Covered** |
| **Week 1** | Nil |
| **Week 2** | Nil |
| **Week 3** | Nil |
| **Week 4** | Nil |
| **Week 5** | Nil |
| **Week 6** | Nil |
| **Week 7** | Nil |

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| **Learning and Teaching Resources****مصادر التعلم والتدريس** |
|  | **Text** | **Available in the Library?** |
| **Required Texts** | Strength of Mterials 3rd edition 1980 by Ferdunand L. Singer and Andrew Pytel. | Yes |
| **Recommended Texts** | 1-An introduction to mechanical engineering part 1by Clifford et al. 2009.2- Engineering Mechanics statics and dynamics . 2009. Schaum. By Nelson, best and MaClen. | Yes |
| **Websites** | Google Engine |

**APPENDIX:**

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|  **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 | **مقبول بقرار** | (45-49) | More work required but credit awarded |
| **F –** Fail | **راسب** | (0-44) | Considerable amount of work required |
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| Note: |  |  |
| NB 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. |

