

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Engineering Materials	Module Delivery	
Module Type	C	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	MPAC103		
ECTS Credits	5		
SWL (hr/sem)	150		
Module Level	1		
Administering Department	Air-Conditioning and Refrigeration Tech. Eng. Dep	College	Engineering
Module Leader	Hussein S. Ketan	e-mail	hussein.kt@uowa.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph. D
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

<p><b>Module Aims</b></p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Explain the atomic structure and types of primary and secondary atomic and molecular bonding.</li> <li>2. Explain the crystal structures and geometry and classify different classes of space lattices in crystalline solids.</li> <li>3. Perform different types of mechanical testing for evaluation of mechanical properties of material.</li> <li>4. Extract information of materials behavior from phase diagram.</li> <li>5. Identify the structures, properties and applications of the main engineering materials (metals, alloys, polymers, ceramics and composites).</li> <li>6. Explain corrosion mechanisms and types of corrosions and methods of corrosion prevention.</li> <li>7. Explain the Nano materials.</li> </ol>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>The student able to:</p> <ol style="list-style-type: none"> <li>1. Mechanical Properties, stress-strain curve, elasticity, plasticity, ductility, young modulus, tensile stress, yield stress, bricking stress, true and engineering stress-strain diagram).</li> <li>2. Knowledge of Ionic bond, inter-atomic distance attraction forces between atoms, coordination number, covalent bond, and Metallic bond.</li> <li>3. Knowledge the Crystal structure, unit cell, types of unit cells simple cubic, Face centered cubic, body centered cubic, atomic packing factor, Previous lattice, Miller index, .</li> <li>4. To Understanding the Phase diagrams</li> <li>5. To know the types of Engineering Materials</li> <li>6. To know Corrosion, Definition, why it happens, Type of corrosion, Dry and wet corrosion. Eight Form of corrosion. Mechanism of crevice corrosion</li> <li>7. To know Methods of prevention and protection.</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <p>1-Crystalline and non Crystalline Materials, Metallic crystal structures crystallographic directions ,crystallographic planes-Types of crystal structure, Packing factor.Bonds ,metallic bond ,ionic bonds ,covalent bond ,vander waals bond , hydrogen bond (12 hr)</p> <p>- Defects ,point defects ,dislocations ,linear defects ,planar defects (3hr)</p> <p>-Mechanical properties ,Hardness (Brinell hardness ,Vickers hardness , Rockwell hardness ) Tensile test, Impact test, Creep test, Fatigue test. (15 hr)</p> <p>-Ferrous and nonferrous alloys in air conditioning and refrigeration equipment's Copper alloys , Aluminum alloys (3hr)</p> <p>-Solidi faction. Solid solution - Phase –diagrams for binary alloys, Complete solubility in both liquid and solid state, Complete solubility in liquid state and complete insolubility in solid state, Complete solubility in liquid state and limited solubility in</p>

	solid state, Iron –carbon systems , Types of iron- carbon systems (12 hr) - Corrosion and corrosion prevention(3hr) -Applications of Nano materials, types ,manufactures of Nano materials.(3hr)
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, Practical testing and Online testing.

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	60	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	150		

<b>Module Evaluation</b> تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	4	10% (10)	3,6, 9,12	
	<b>Assignments</b>	2	10% (10)	6, 12	
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	
	<b>Report</b>	1	10% (10)	14	
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hr	10% (10)	7	
	<b>Final Exam</b>	2hr	50% (50)	15	
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Introduction to engineering material science and needs of engineering materials study
<b>Week 2</b>	Classification of materials
<b>Week 3</b>	Ionic bond, inter-atomic distance attraction forces between atoms, coordination number, covalent bond, and Metallic bond.
<b>Week 4</b>	Crystal structure system ,examples and diagrams with definitions
<b>Week 5</b>	Previous lattice, packing factor
<b>Week 6</b>	Definition of alloys, binary alloys, phase diagrams (equilibrium thermal diagrams), eutectic; solid solution
<b>Week 7</b>	solid solution and combination type diagram, Iron-carbon face diagram
<b>Week 8</b>	Iron-carbon cooling curve, phases, reactions, and multi phases
<b>Week 9</b>	Types of thermal equilibrium diagrams
<b>Week 10</b>	Mechanical test and some types
<b>Week 11</b>	Corrosion and types of corrosion
<b>Week 12</b>	Composite material
<b>Week 13</b>	Powder methodology
<b>Week 14</b>	Nano materials
<b>Week 15</b>	Exam

## Learning and Teaching Resources

### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	1- William D. Callister, Jr. and David G. Rethwisch, Materials Science and Engineering An Introduction, 2007 John Wiley & Sons, Inc. 2- Jones, D.A., "Principal and Protection of Corrosion", PrenticeHall	Yes

<b>Recommended Texts</b>	1-W. Bolton, R. A. Higgins. Materials for Engineers and Technicians, 2014. 2-Mechanical Properties of Materials, David Roylance 2008. 3-William Bolton, Engineering Materials, 2014	no
<b>Websites</b>		

<b>Grading Scheme</b> مخطط الدرجات				
<b>Group</b>	<b>Grade</b>	<b>التقدير</b>	<b>Marks (%)</b>	<b>Definition</b>
<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.