MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Engineering Materials		**Module Delivery**
Module Type	C		• ☒ **Theory** • ☐ **Lecture** • ☐ **Lab** • ☐ **Tutorial** • ☐ **Practical** • ☐ **Seminar**
Module Code	UOMU021014		
ECTS Credits	5		
SWL (hr/sem)	150		
Module Level	1	**Semester of Delivery**	1
Administering Department	Air-conditioning and Refrigeration Eng. Tech. Dep.	**College**	UOMU
Module Leader	Hiba M. Abd	**e-mail**	hiba.mohsin.abd@uomus.edu.iq
Module Leader's Acad. Title	Assist Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	15/07/2023	**Version Number**	1.0

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. Explain the atomic structure and types of primary and secondary atomic and molecular bonding.

	2. Explain the crystal structures and geometry and classify different classes of space lattices in crystalline solids. 3. Perform different types of mechanical testing for evaluation of mechanical properties of material. 4. Extract information of materials behavior from phase diagram. 5. Identify the structures, properties and applications of the main engineering materials (metals, alloys, polymers, ceramics and composites. 6. Explain corrosion mechanisms and types of corrosions and methods of corrosion prevention. 7. Explain the Nano materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student able to: 1. Mechanical Properties, stress-strain curve, elasticity, plasticity, ductility, young modulus, tensile stress, yield stress, bricking stress, true and engineering stress-strain diagram). 2. Knowledge of Ionic bond, inter-atomic distance attraction forces between atoms, coordination number, covalent bond, and Metallic bond. 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. 4. To Understanding the Phase diagrams. 5. To know the types of Engineering Materials. 6. To know Corrosion, Definition, why it happens, Type of corrosion, Dry and wet corrosion. Eight Form of corrosion. Mechanism of crevice corrosion. 7. To know Methods of prevention and protection.
Indicative Contents المحتويات الإرشادية	indicative contents include the following: • 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) • Defects, point defects, dislocations, linear defects, planar defects (3hr) • Mechanical properties, Hardness (Brinell hardness, Vickers hardness, Rockwell hardness) Tensile test, Impact test, Creep test, Fatigue test. (15 hr) Ferrous and nonferrous alloys in air conditioning and refrigeration equipment's Copper alloys, Aluminum alloys (3hr) • 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 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)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, reports, seminars, Practical testing and Online testing.

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

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to engineering material science and needs of engineering materials study
Week 2	Classification of materials.
Week 3	Ionic bond, inter-atomic distance attraction forces between atoms, coordination number, covalent bond, and Metallic bond.
Week 4	Crystal structure system, examples and diagrams with definitions.
Week 5	Previous lattice, packing factor.
Week 6	Definition of alloys, binary alloys, phase diagrams (equilibrium thermal diagrams), eutectic; solid solution.
Week 7	solid solution and combination type diagram, Iron-carbon face diagram.

Week 8	Iron-carbon cooling curve, phases, reactions, and multi phases.
Week 9	Types of thermal equilibrium diagrams.
Week 10	Mechanical test and some types.
Week 11	Corrosion and types of corrosion
Week 12	Composite material
Week 13	Powder methodology
Week 14	Nano materials
Week 15	**Final Exam**

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	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", Prentice Hall	Yes
Recommended Texts	1- W. Bolton, R. A. Higgins. Materials for Engineers and Technicians, 2014. 2- Mechanical Properties of Materials, David Roylance 2008. 3- Williiam Bolton, Engineering Materials,2014	No
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.