Module Information

معلومات المادة الدراسية

Module Title	**Properties of Engineering Materials**			**Module Delivery**	
Module Type	**B**			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**UOMU027044**				
ECTS Credits	**4**				
SWL (hr/sem)	**120**				
Module Level		**UGII**	**Semester of Delivery**		**One**
Administering Department		**Fuel and energy Engineering Techniques**	**College**	**Al- Mustaqbal university**	
Module Leader	Aseel Safi Hamzah		**e-mail**	ASEEL.SAFI.HAMZAH@uomus.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		PhD in material engineering
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**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. 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.
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, crystalline Planes, X-ray diffraction. 4. To Understanding the Phase diagrams 5. To know the 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 content includes the following: • Introduction to types of engineering material classification and needs of engineering material. • Mechanical teste and calculations of engineering stress and strain values, • Plotting of thermal equilibrium phase diagrams • Understanding of hardness test, tensile test diagrams. • Classification of engineering material due to iron content • Ferrite and non-ferrite material • Types of ferrite material, steel, cast iron • Improvement of engineering mechanical properties due to metal additives weight percent. • Types of cast iron • Cooling curve due to metal and alloys

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	73	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	120		

Module Evaluation

تقيم 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)	6, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	14	
Summative assessment	Midterm Exam	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to engineering material science and 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, Miller index, crystalline Planes, X-ray diffraction. packing facter
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
Week 12	Composite material
Week 13	Powder methodology
Week 14	Types of furnaces
Week 15	Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1& 2	Safety in laboratory
Week 3	How to write a scientific report
Week 4	Tensile test
Week 5 & 6	Compression test with report discussions
Week 7	Bending test
Week 8-9	Twesting test with reports discussions
Week 10	Impact test
Week 11	Hardness test

Week 12	Image microscopic investigations with preparation sample process
Week 13	Scientific visit or reports data checking
Week 14	Dissection of report or creep test
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	[1] MATERIALS SCIENCE and ENGINEERING, by, William D. Callister, Jr. David G. Rethwisch, Wiley Binder Version ISBN: 978-1-118-47770-0, 2000 John Wiley & Sons [2] Van Vlack, Elements of Material Science [3] Khanna O.P., A Text Book of Material Science & Metallurgy [4] Fontana, M.G., "Corrosion Engineering", McGrawHill. [5] Jones, D.A., "Principal and Protection of Corrosion", PrenticeHall	yes
Recommended Texts	Newnes Engineering Materials Pocket Book 1st Edition - January 1, 1987 Author: W. Bolton	no
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	ممتاز	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	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**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.