	Ministry of Higher Education and Scientific Research - Iraq Al-Mustaqbal University College for engineering and technology Department of Biomedical Engineering	

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Materials Engineering			**Module Delivery**	
Module Type	Core			**Theory** **Lecture** **Tutorial** **Lab.**	
Module Code	UOMU0102035				
ECTS Credits	٥				
SWL (hr/sem)	125				
Module Level	2		**Semester of Delivery**	1	
Administering Department	CES.PR		**College**	CES	
Module Leader	Zainab Hassan		**M**	Zainab.Hassan.Ali@uomus.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**	Master	
Module Tutor			**e-mail**	Zainab.Hassan.Ali@uomus.edu.iq	
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**		

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	PYST113	**Semester**	1
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. To have an understanding of interatomic bonding in solids. 2. To study the properties of some materials related to their crystal structures. 3. To study the phenomena that occur during a heat treatment involving atomic diffusion. 4. To understand how the various mechanical properties are measured and what these properties represent. 5. To knowledge and understanding of phase diagrams related to the design and control of heat-treating procedures. 6. To knowledge of the various types of composites, as well as an understanding of the dependence of their behaviors on the characteristics, relative amounts, geometry/distribution, and properties of the constituent phases. 7. To study some of the properties of ceramics. .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. 2- Developing a solid foundation of fundamental concepts spanning material science and engineering 3- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
Indicative Contents المحتويات الإرشادية	***Classification of Materials*** (3 h) Historical Perspective, Materials Science and Engineering and Classification of Materials. ***Atomic Structure and Interatomic Bonding*** (3 h) Atomic Structure and Atomic bonding in Solids. ***The Structure of Crystalline Solids*** (9 h) Crystal Structures Crystallographic Points, Directions, and Planes Crystalline and Nanocrystalline Materials ***Imperfections in Solids.*** (3 h) Types of defects Microscopic Examination ***Diffusion*** (6 h)

	Introduction Diffusion Mechanisms Fick's First Law Fick's Second Law—Nonsteady -State Diffusion Factors That Influence Diffusion ***Mechanical Properties of Metals*** (6 h) Elastic Deformation Plastic Deformation Fracture Fatigue Creep ***Phase Diagrams*** (6 h) Definitions and Basic Concepts Binary Phase Diagrams ***Composites*** (3 h) *Particle-Reinforced Composites* Fiber-Reinforced Composites Structural Composites ***Structures, Properties and Applications of Ceramics*** (6 h) Ceramic Structures Mechanical Properties Types and Applications of Ceramics
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 Lectures / Tutorial / Inspiring teamwork and develop collaboration skills among students through group solving tasks / video clips and Laboratories' Experimenter. Using assessment techniques such as quizzes and tests, and classroom polls to measure student's understanding and evolution throughout the course. Providing recurrent feedback to report misunderstanding and improve learning.

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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (10)	2, 5, 9	LO #1, 2
	Online Assignments	1	2% (2)	Continuous	LO #1, 2
	Onsite Assignments	2	8 % (4)	Continuous	LO # 1,2
	lab	1	10% (10)		LO # 3
Summative assessment	**Midterm Exam**	2hr	10% (10)	10	LO #1, 2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to material science and engineering, classification of materials.
Week 2	***Structure and Interatomic Bonding:*** Atomic Structure and Atomic bonding in Solids.
Week 3	Crystallographic and Crystal Structures
Week 4	Crystallographic Points, Directions, and Planes
Week 5	Crystalline and Nanocrystalline Materials
Week 6	***Imperfection in Solids:*** Types of defects and Microscopic Examination
Week 7	Introduction to Diffusion, Diffusion Mechanisms, and Fick's First Law
Week 8	Fick's Second Law—Nonsteady -State Diffusion, and Factors That Influence Diffusion
Week 9	***Mechanical Properties of Metals,*** Elastic Deformation
Week 10	Plastic Deformation, Fatigue, Creep, and Fracture
Week 11	***Phase Diagrams:*** Definitions and Basic Concepts
Week 12	Binary Phase Diagrams
Week 13	***Composites:*** *Particle-Reinforced Composites,* Fiber-Reinforced Composites , and Structural

	Composites
Week 14	**Structures of Ceramics**
Week 15	Properties and Applications of Ceramics
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	William D. Callister, Jr., Materials science, and engineering, Tenth edition, 2018.	Yes
Recommended Texts	1. Donaled R. Askeland, The science and engineering of materials, international student edition, 2006. 2. Smith W.F. and Hashemi J. "Foundations of Materials Science and Engineering" McGraw- Hill 4th Edition (2002) 3. Shackelford James " Materials Science for Engineers" Pearson 6th Ed	Yes
Websites		

Lab. Experiments

Exp. No.	Exp. Name.
Exp. No. 1	Tension test
Exp. No. 2	Hardness Testing
Exp. No. 3	Bending Test
Exp. No. 4	Creep Test
Exp. No. 5	Abrasion Test
Exp. No. 6	Impact Test
Exp. No. 7	Moisture Measurement in Engineering Materials
Exp. No. 8	Determination of Linear Thermal Expansion for a Solid
Exp. No. 9	Microstructure Examination of Pb-Sn alloys using the metallurgical microscope

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
Note:				