

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Material Science	Module Delivery		
Module Type	Basic	Method	h/week	Frequency
Module Code	MPH36027	Theory	2	14
ECTS Credits	5 ECTS	Lecture	Choose an item.	Choose an item.
SWL (hr/sem)	125	Lab	Choose an item.	Choose an item.
		Tutorial	-	-
		Practical	Choose an item.	Choose an item.
		Seminar	1	15
Module Level	Level 3	Course of Delivery	Course 2	
Administering Department	MPH	College	AMS	
Module Leader	Hikmat Adnan Jawad	e-mail	hikmatadnan@gmail.com	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Prof	
Module Tutor	Hikmat Adnan Jawad	e-mail	hikmatadnan@gmail.com	
Peer Reviewer Name	Assist. Prof. Dr. Shaimaa Hussein Nofal	e-mail	shaymaa@uowa.edu.iq	
Scientific Committee Approval Date	February 6, 2026	Version Number	1.0	



أ.د. شيماء حسين نوفال
٢٠٢٦ - ٢٠٢٥



Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	General Materials Science	Course	Course 2
Co-requisites module	None	Course	None

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none">1. To introduce students to the fundamental principles of materials science and their relevance to medical physics.2. To develop a clear understanding of the relationship between material structure, properties, and performance.3. To provide students with knowledge of different classes of materials, including metals, ceramics, polymers, nanomaterials, and biomaterials.4. To explain atomic structure, bonding mechanisms, and their influence on material behavior.5. To enable students to understand and analyze the mechanical, thermal, electrical, magnetic, and optical properties of materials.6. To familiarize students with material preparation and processing techniques used in scientific and medical applications.7. To highlight the role of materials science in medical physics, including medical devices, diagnostic systems, and therapeutic technologies.8. To prepare students with a solid foundation for advanced courses and research in medical physics and related fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none">1. Explain fundamental concepts and principles of materials science.2. Classify materials based on their atomic structure and physical properties.3. Describe the atomic structure and bonding mechanisms in materials.4. Analyze mechanical, thermal, electrical, magnetic, and optical properties of materials.5. Understand the structure, properties, and applications of polymers, nanomaterials, and biomaterials.6. Identify common material preparation and processing techniques.7. Evaluate the role of materials science in medical physics applications, including medical imaging, therapy, and biomedical devices.

Indicative Contents المحتويات الإرشادية	<u>Theory Lectures</u>
	Week 1: Introduction to Materials Science and Its Importance in Medical Physics [2 hrs.] <ul style="list-style-type: none"> • Definition of materials science and its interdisciplinary nature • Historical development of materials science • Relationship between structure, properties, and applications • Importance of materials science in medical physics and healthcare technologies <hr/>
	Week 2: Fundamental Concepts and Classification of Materials [2 hrs.] <ul style="list-style-type: none"> • Basic concepts in materials science • Classification of materials: metals, ceramics, polymers, composites • Overview of functional and biomedical materials <hr/>
	Week 3: Atomic Structure [2 hrs.] <ul style="list-style-type: none"> • Atomic models and electronic structure • Energy levels and electron configurations

Learning and Teaching Strategies الاستراتيجية التعلم والتعليم	
Strategies	The lecturer follows the following strategies while teaching this course as follows: <ol style="list-style-type: none"> 1- Lectures. 2- Assignments / Projects 3- Group discussions. 4- Quizzes and Assessments. 5- Feedback and Reflection.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعاً

Structured SWL (h/sem) الحمل الدرايس المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدرايس المنتظم للطالب أسبوعياً	2.13
Unstructured SWL (h/sem) الحمل الدرايس غير المنتظم للطالب خلال الفصل	93	Unstructured SWL (h/w) الحمل الدرايس غير المنتظم للطالب أسبوعياً	6.20
Total SWL (h/sem) الحمل الدرايس الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time Number	Weight (Marks)	Week Due															Relevant Learning Outcome																		
				W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10									
Formative	Quizzes	2	10%			*								*						*	κ																
	Report	1	5%												*								*	*													
	Lab Report	-	-																																		
	Project	1	5%											*										*	κ												
	Online Assig.	-	-																				κ														
	Onsite Assig.	1	10%						*														κ					κ									
	Seminar	1	10%															*																			
Summative	Mid. Exam	1hr	10% (10)						*										*	κ	κ	*	*	κ													
	Final Exam	3hr	50% (50)	Week 16															*	κ	κ	*	*	κ	κ	κ	κ	κ	κ	κ	κ	κ	κ	κ	κ	κ	κ
Total assessment			100%																																		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Materials Science
Week 2	Fundamental Concepts
Week 3	Types of Materials
Week 4	Atomic Structure
Week 5	Mechanical properties of materials
Week 6	Thermal properties
Week 7	Mid. Exam
Week 8	Electrical and magnetic properties
Week 9	Optical properties
Week 10	Refractive index
Week 11	Polymers
Week 12	Nanomaterials
Week 13	Biomaterials
Week 14	Material preparation techniques
Week 15	Applications of materials science in medical physics

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Callister, W. D., & Rethwisch, D. G. <i>Materials Science and Engineering: An Introduction</i>	Choose an item.
Recommended Texts	Ratner, B. D. et al. <i>Biomaterials Science: An Introduction to Materials in Medicine</i>	Choose an item.
Websites	https://content.ampp.org/materials-performance/article-abstract/56/10/68/70869/Engineering-Materials?redirectedFrom=fulltext&utm_term=&utm_campaign=EDU+General+Promotion+-+Online+Learning+-+MAX+-+2024&utm_source=adwords&utm_medium=ppc&hsa_acc=3263191249&hsa_cam=23530471416&hsa_grp=&hsa_ad=&hsa_src=x&hsa_tgt=&hsa_kw=&hsa_mt=&hsa_net=adwords&hsa_ver=3&gad_source=1&gad_campaignid=23540251366&gbraid=0AAAAADgqZsYopFBHiQDrift1RmKjIAj_5&gclid=Cj0KCQiA4pvMBhDYARIsAGfgvwkmFMTiN8LbwP-V6bVKYsNewXgOtVGDOQ2ZaGTry1LA5wNuJNDtmlaAs5WEALw_wcB	

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 "automatic fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.