

MODULE DESCRIPTION FORM

Module Information			
Module Title	Materials science		Module Delivery
Module Type	Basic		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar
Module Code	LAER212		
ECTS Credits	6		
SWL (hr/sem)	93 H/Sem.		
Module Level	2	Semester of Delivery	3
Administering Department	Laser and optoelectronics Eng.	College	College of Engineering
Module Leader	Hanaa.m.hadad	e-mail	hanaa.m.hadad@alayer.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.sc
Module Tutor	Hanaa.m.hadad	e-mail	hanaa.m.hadad@alayer.edu.iq
Peer Reviewer Name		e-mail	hasnaa.Mohammed@alayer.edu.iq
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules			
Prerequisite module		Semester	1
Co-requisites module		Semester	4

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	fundamental structure of materials (metals, ceramics, polymers, semiconductors), atomic/molecular structure to mechanical, thermal, electrical, and optical properties, crystallography, defects, and phase diagrams, materials characterization methods used in engineering, knowledge to laser and optoelectronic device materials.



Module Learning Outcomes	Knowledge	A2	A2.1 Define atomic Structure, Laser types and Crystallography and Crystal Structure. A2.2Classify materials, Crystal Symmetry, Unit Cell and Types of Polymers. A2.3 illustrates Atomic Structure, Materials Classification and Imperfections or defects in Solid.
		A3	A3.1Define Occupational safety and health and Materials Inspection. A3.2 Describe Strength of Materials-Tensile Test. A3.3 Applied Occupational safety and health and Method of specimen preparation for micro examination.
	skills	B2	B1.1 Function efficiently as an individual. B1.2 Function as a member of multidisciplinary and multicultural teams.
	Ethics	C1	C1.1Define professional and ethical responsibilities. C1.2 Demonstrate diversity in their commitment to ethical responsibilities.
Indicative Contents	Part A – Structure of Materials Atomic structure and bonding. Crystal structures (FCC, BCC, HCP). Crystal defects and dislocations. Part B – Mechanical and Thermal Properties Stress-strain behavior, elasticity, plasticity, hardness Thermal expansion, conductivity. Part C – Electrical and Optical Properties Conductors, semiconductors, insulators. Band theory of solids. Optical properties of materials relevant to lasers. Part D – Materials selection and applications in optoelectronics.		
Learning and Teaching Strategies			
Strategies	• Presentations • Discussions • Tutorial and graphics • Problem solving • Brainstorming • Research and reporting • Problem Solving • Report & discussion assessment		
Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	6
Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	5.5



Total SWL (h/sem)		93
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري		
	Material Covered	LOs
Week 1	Atomic Structure	A2 B1C1
Week 2	Electron Configuration of the Atoms Materials Classification	A2 B1 C1
Week 3	Crystallography and Crystal Structure Unit Cell	A3B1 C1
Week 4	Crystal Symmetry Crystal Planes and their Indices	A2 B1 C1
Week 5	Imperfections or defects in Solid Crystalline Materials	A2B1 C1
Week 6	Laser System	A3 B1 C1
Week 7	Laser emission conditions	A2 B1 C1
Week 8	Laser types	A2 B1 C1
Week 9	Neodymium laser	A2 B1C1
Week 10	Polymer Texture of Polymers	A2 B1 C1
Week 11	Intermolecular Force in Polymers	A2 B1 C1
Week 12	The Effect of Molecular Forces on the Polymer Properties	A2 B1 C1
Week 13	Types of Polymers and their Classification	A2 B1 C1
Week 14	Properties of thermosetting polymers	A2 B1 C1
Week 15	Factors determining polymer properties	A2 B1 C1
Week 16	Preparatory week before the final Exam	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر		
	Material Covered	
Week 1	Occupational safety and health	A3 B1 C1
Week 2	Materials Inspection	A3 B1 C1
Week 3	Study of Metallurgical Microscope	A3 B1 C1
Week 4	Method of specimen preparation for micro examination part1	A3 B1 C1
Week 5	Method of specimen preparation for micro examination part2	A3 B1 C1
Week 6	Strength of Materials-Tensile Test	A3 B1 C1
Week 7		

Learning and Teaching Resources



مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Charles kittel/ Crystal Structure	Yes
Recommended Texts		
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.				

