

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Solid State Physics		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	Phy-442		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level		Semester of Delivery	
Administering Department	Physics	College	
Module Leader	Ziad Tariq Khodair	e-mail	ziad_tariq@uodiyala.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.
Module Tutor	-----	e-mail	-----
Peer Reviewer Name	-----	e-mail	-----
Scientific Committee Approval Date	9/05/2024	Version Number	1.0

Relation with other Modules				
العلاقة مع المواد الدراسية الأخرى				
Prerequisite module	None		Semester	
Co-requisites module	Principles of Solid state physics		Semester	4

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. The purpose of the course is to introduce students to the basic principles of solid state physics and to develop required physical skills to solve problems in solid state physics, and other fields of experimental physics. 2. Understand the relation between classical and modern theories to explain electrical conductivity of metals, insulators, and semiconductors. 3. To understand the semiconductors properties, magnetic properties, and superconductivity.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. Explain Free electron, and Classical theory of free electrons. 2. Defines thermal conductivity for electrons. 3. Explain Lorentz theory for free electron conductivity. 4. Know Quantum free electron model 5. Explain Density of state for free electron gas in 1 D, and in 3D. 6. Can explain Sommerfeld theory for electrical conductivity. 7. Explain semiconductors science. 8. Understand the magnetic properties . 9. Define superconductivity
Indicative Contents المحتويات الإرشادية	<p style="text-align: center;">Indicative content includes the following:</p> <p style="text-align: center;">Part 1</p> <p>An introduction to Electrical properties of solids . Free electron model and Classical theory of free electrons . Thermal conductivity for electrons</p> <p style="text-align: center;">Part 2</p> <p>Thermal conductivity for electrons Lorentz theory for free electron conductivity Band theory of solids .</p> <p style="text-align: center;">Part 3</p> <p>Semiconductors Magnetic properties Superconductivity</p>
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	<p>The main strategy that will be adopted in delivering this module is to understand the relation between classical and modern theories to explain electrical conductivity of metals, insulators, and semiconductors.</p> <p>Learn the importance of magnetic materials, semiconductors, and superconducting materials and their modern scientific applications.</p>

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4 and 10	LO #1, #2, #3 and #4, #5, #6, #7, #8
	Assignments	2	10% (10)	5 and 12	LO #1, #2, #3 and #4, #5, #6, #7, #8
	Project	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	LO #1, #2, #3 and #4, #5, #6, #7, #8
Summative assessment	Midterm Exam	2hr	10% (10)	8	LO #1 - #6
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Electrical properties of solids (Introduction)
Week 2	Free electron model ,Classical theory of free electrons
Week 3	Lorentz theory for free electron conductivity, and Quantum free electron model
Week 4	The band theory of solids
Week 5	Bloch function, and The Kronik-Penny model
Week 6	An introduction in Semiconductors
Week 7	Intrinsic Semiconductors, and Extrinsic Semiconductors
Week 8	Doping of Semiconductors, Hall effect
Week 9	Mid-term Exam
Week 10	An introduction in magnetic materials
Week 11	Diamagnetic ,paramagnetic, ferromagnetic materials
Week 12	Antiferromagnetism and ferromagnetism
Week 13	An introduction in Superconductivity
Week 14	Critical Temperature, and Critical Magnetic field
Week 15	Messiner effect, and BCS Theory

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Electrical conductivity
Week 2	Energy gap
Week 3	Hall effect
Week 4	Solar cells 1
Week 5	Solar cells 2
Week 6	Magnetism in metals
Week 7	Meissner effect

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Elementary Solid State Physics: Principles and Applications Addison –Wesley Publishing Company, First edition (1975) by M. Ali Omar	Yes
Recommended Texts	1. Introduction to Solid State Physics, Charles Kittel, John Wiley & Sons, Inc, New York USA (1996). 2. Solid State Physics, J. S. Blakemore, 2nd edition, Cambridge university press 1985. 3. Solid state physics , MJP Publishers, India, 1 st edition (2013)	Yes No Yes
Websites	https://www.physics.udel.edu/~bnikolic/teaching/phys624/lectures.html https://archive.nptel.ac.in/courses/115/105/115105099/	

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.