

	فيزياء الجوامد 2	اسم المقرر:
	فيز 4722	رقم المقرر:
	فيز 3712	اسم ورقم المتطلب السابق:
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	السابع	مستوى المقرر:
	3 (0+0+3)	الساعات المعتمدة:
Module Title:	Solid state physics II	
Module ID:	PHYS 4722	
Prerequisite (Co-requisite) :	PHYS 3712	
Co-requisite :	--	
Course Level:	Seventh	
Credit Hours:	3 (3+0+0)	



Module Description

وصف المقرر :

Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function)
 Statistical view of free electrons
 Semiconductor materials – Band theory in semiconductors – energy gap in semiconductors – holes – Fermi level in semiconductor – effect of impurities on semiconductors – applications)
 Magnetism in solid state – Superconductivity – Electrical properties of semiconductors – Electrical and thermodynamic properties of semiconductors
 Dielectric and optical properties of solids

Module Aims

أهداف المقرر :

The student is expected to:	
-Understand the Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function)	
- Learn the statistical view of free electrons	
- Understand the Semiconductor materials – Band theory in semiconductors – energy gap in semiconductors – holes – Fermi level in semiconductor – effect of impurities on semiconductors – applications)	
- Understand the magnetism in solid state – Superconductivity – Electrical properties of semiconductors – Electrical and thermodynamic properties of semiconductors	
- Learn the dielectric and optical properties of solids	

Learning Outcomes:

مخرجات التعليم:

1	Revision of the free-electron model and further details of the nearly-free electron model of electronic structure; modifications to the Fermi surface near zone boundaries. The tight binding method.	
2	- demonstrate an understanding of the semi-classical dynamics of electrons in solids - demonstrate an understanding of the Fermi surface and how it is modified by the presence of a weak crystal potential - describe the microscopic origins of the magnetic and electrical properties of solids and explain some ground-state and finite-temperature properties of ferromagnets. - Explain the physical principles for different types of electric and magnetic phenomena in solid materials (like e.g. para-electricity, dielectricity, ferroelectricity, superconductivity, paramagnetism, diamagnetism, ferromagnetism, anti-ferromagnetism etc.) and in relevant cases relate this to macroscopically measured physical quantities.	

Course Contents:

محتوى المقرر:

ساعات التدريس (Hours)	عدد الأسابيع (Weeks)	قائمة الموضوعات (Subjects)
3	1	Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function)
9	3	Statistical view of free electrons
9	3	Semiconductor materials – Band theory in semiconductors – energy gap in semiconductors – holes – Fermi level in semiconductor – effect of impurities on semiconductors – applications)
12	4	Magnetism in solid state – Superconductivity – Electrical properties of semiconductors – Electrical and thermodynamic properties of semiconductors
6	2	Dielectric and optical properties of solids

Textbook and References:

المقرر والمراجع المساندة:

سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم الكتاب المقرر Textbook title
(2004) ISBN: 9780471415268. 8 th ed.	New York, NY: John Wiley & Sons.	Kittel, Charles.	<i>Introduction to Solid State Physics.</i>
سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم المرجع Reference
(1976) ISBN: 9780030839931	New York, NY: Holt, Rinehart and Winston.	Ashcroft, Neil W., and N. David Mermin.	<i>Solid State Physics</i>

	(1994) ISBN: 0201607336	Addison Wesely	M. A. Omar	Elementary Solid State Physics	
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