

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Solid state Physics(2)
Course number	PHYS4324
Faculty	
Department	
Course type	College Needs
Course level	4
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

- 1 - Provide the students with understanding of matter in condensed states in different phases and transition between them
- 2 - Concern with understanding the nature of matter, including solids, polymer liquid crystals, magnetic materials, and dielectric materials

Intended Learning Outcomes

Knowledge and Understanding	<ul style="list-style-type: none">* Explain the basics, physical parameters, and properties of condensed matter* Mention the mean field theory, Heisenberg model, mean field theory of ferromagnetic, and Curie-Weiss law* Define the critical temperature and nano-magnetic devices* Describe the liquid crystalline properties and the nonlinear properties of magnetic nanostructures
Intellectual Skills	<ul style="list-style-type: none">* Interpret the natural phenomena such as piezoelectric phenomenon and behavior of materials using the physics theories and different properties of condensed matter* Demonstrate the properties of materials and their roles in the applications* Compare between ferroelectric materials and thermal electrical materials and among diamagnetic, paramagnetic, anti-ferromagnetic, and ferromagnetic materials* Demonstrate the effect of critical temperature on the material properties
Professional Skills	<ul style="list-style-type: none">* Solve problems on different models and theories which describe the physics of solid state* Dissect the different properties of the materials* Derive London equation and Debye equation* Classify the elements of periodic table according to the magnetic properties
General Skill	<ul style="list-style-type: none">* Use the technology knowledge and internet in self-learning of advanced topics in solid state physics* Utilize the models and methods efficiently for explaining a physical formula and parameters of different states of condensed matter* Show the sense of beauty and neatness the different states of condensed matter

Course Contents

<ol style="list-style-type: none">1 - Semiconductors and Optical properties of solids2 - Dielectric properties of solids3 - Magnetic properties & paramagnetic4 - Mean field theory of ferromagnetic5 - Anti-ferromagnetic & Curie - Weiss law & thermal excitation of magnons6 - Volume magnetic properties, magnetic domains, magnetic order7 - London equation, semiconductors types I and II, superconductivity8 - Ferroelectric materials and thermal electric materials9 - Nonlinear properties of magnetic nanostructures
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Teaching and Learning Methods

<ol style="list-style-type: none">1 - Lectures2 - Discussions3 - Class activity4 - Inquiry5 - Problem solving

Teaching and Learning Methods for the Disabled Students

<ol style="list-style-type: none">1 - Over head projector2 - appropriate teaching accommodation and Computers3 - Laboratory with computer terminal
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Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
First Mid Term Examination	week 8	20
Quizzes	4-10 weeks	5
Presentation	Week 9	5
Second Mid-term Examination	Week 9	20

Books and References

Course note	Lecturer private notes
Essential books	Introduction to solid state physics", C.Kittel, John Wiley & Sons, Inc Introduction to Solids", L.V. Azaroff, McGrew-Hill
Recommended books	P.M. Chaikin and T. C. Lubensky, Principles of Condensed Matter Physics , Cambridge University Press, 200 M.P. Marder, Condensed matter physics , John Wiley, 2000 Elementary Solid State Physics. By M.Ali Omar Revised Printing Addison Wesley Longman 1993 P. Misra, Physics of Condensed Matter ,Academic Press, 2011
Other References (Periodical, web sites, etc.)	http://www.splung.com http://hyperphysics.phy-astr.gsu.edu/hbase/hph.html http://www.physicstoday.org/