هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Solid State Physics (2)
Course Code:	2034102-2
Program:	Bachelor in Physics
Department:	Physics Department
College:	College of Science
Institution:	Taif University
Version:	1
Last Revision Date:	2020

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8^{th}/4^{th})					
4. Course general Description:					
Energy band theory, the nearly free electron model and effective mass concept, classification of materials according to energy band gap, conduction in intrinsic and extrinsic semiconductors, magnetic materials (paramagnetic, diamagnetic and ferromagnetic materials), theory of superconductivity, Meissner effect and Josephson effect.					
5. Pre-requirements for this course (if any):					
Solid State Physics (1) 203350-4 Statistical Physics 203316-3					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
This course covers topics related to solid state physics, including energy band structure, classification of materials according to energy band gaps, conduction in semiconductors, magnetic materials, superconductivity and some materials applications.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30 (2 per week)	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Classify materials on the basis of their band structures and materials applications on the basis of their conductivity or resistivity.	K3	Lecture	Written exams Homework
1.2	Outline the magnetic properties and magnetic categories of materials and describe the superconductivity theory in solids	K4	Lecture	Written exams Homework
2.0	Skills			
2.1	Develop simple models to determine the energy band structure and magnetic properties of materials and to classify them accordingly.	S3	Problem solving Group discussion	Written exams Homework reports
2.2	Develop skill versatility in solving problems related to electrical and magnetic properties of solids.	S2	Problem solving	Written exams Homework reports
3.0	Values, autonomy, and responsibility			
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	V1	Group discussion	Homework reports Essays
3.2	Use internet and computer skills to develop knowledge in solid state physics.		Group discussion	Homework reports Essays

C. Course Content

No	List of Topics	Contact Hours
1.	**1- Band theory:** ▪ Energy spectra in atoms, molecules and solids ▪ Bloch theorem ▪ Brillouin zones ▪ Number of states in the band ▪ Nearly free electron model	8
2.	**2- Classification of the materials according to the energy band structure:** ▪ Dielectrics ▪ Semiconductors ▪ Conductors. ▪ Transport properties in Conductors and Semiconductors (Hall effect and Quantum Hall effect) ▪ Optical properties in solids	6
3.	Mid-term exam1	2
4.	**3- Magnetism and magnetic resonance:** ▪ Magnetic susceptibility ▪ Paramagnetism ▪ Ferromagnetism in metals and insulators ▪ Paramagnetic resonance ▪ Nuclear magnetic resonance.	6
5.	Mid-term exam2	2
6.	**4- Superconductivity:** ▪ Zero resistance ▪ perfect diamagnetism and Meissner effect ▪ the critical field ▪ theory of superconductivity ▪ Josephson effect ▪ Applications of superconducting materials.	4
7.	**Revision**	2
	Total	**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam1	8th	15 %
2.	Midterm Exam2	12th	15 %
3.	Activities	Periodically	20 %
4.	Final exam	16th	50 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1- Elementary Solid state Physics, M A Omar, Addison – Wesley publishing company, USA (1993). 2- Introduction to Solid State Physics, Charles Kittle, John Wiley & Sons, Inc., New York, 1996.
Supportive References	
Electronic Materials	http://www.crystallography.net/cod/result.php http://hyperphysics.phy-astr.gsu.edu/hbase/hph.html
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	Lecture notes PowerPoint presentations

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Faculty Program coordinator Departmental council	Indirect
Quality of learning resources	Students Instructor Faculty	Indirect
The extent to which CLOs have been achieved	Program leaders Faculty	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**PHYSICS DEPARTMENT COUNCIL**
REFERENCE NO.	**NO. 4-45**
DATE	**27/09/2023 (12/03/1445)**