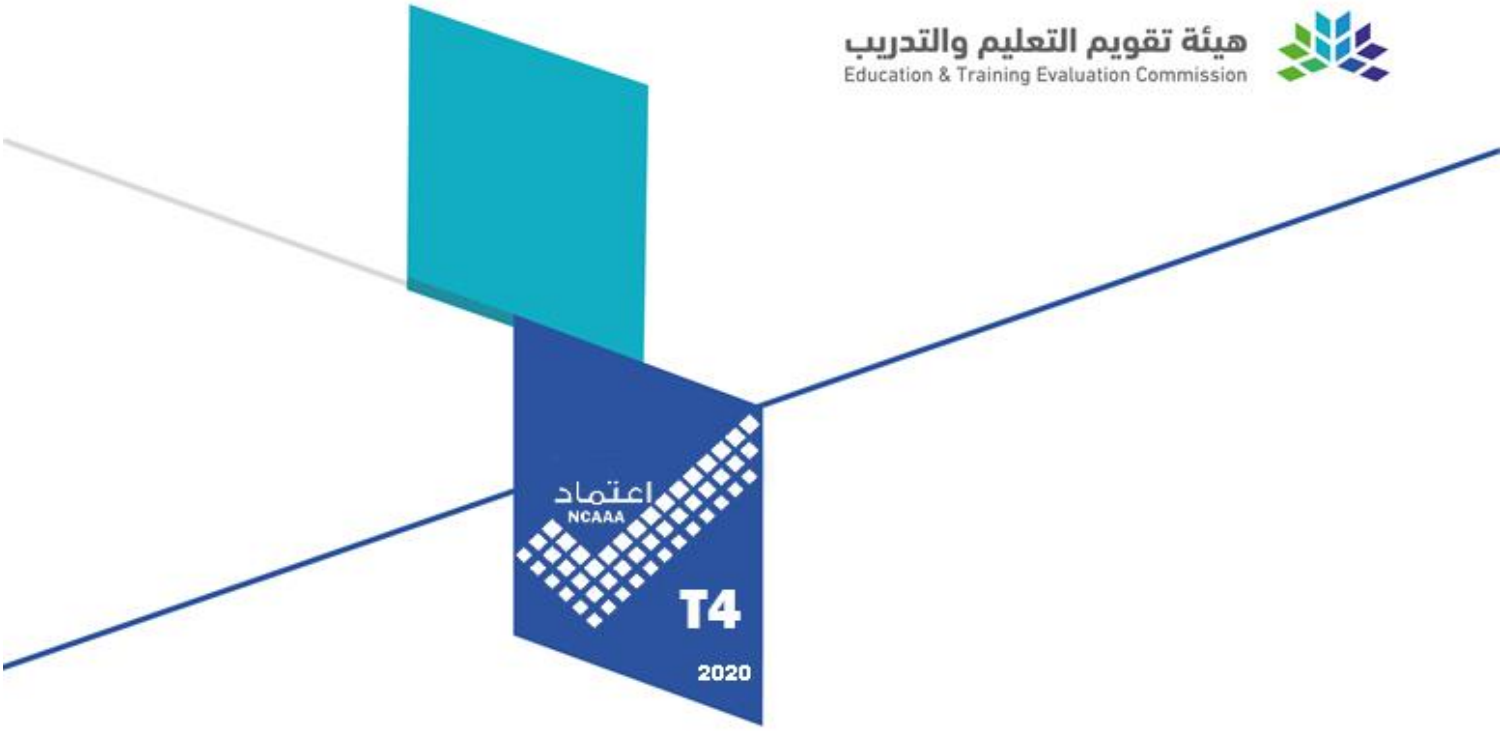
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Solid State Physics (2)**
Course Code:	**2034102-2**
Program:	**Bachelor in Physics**
Department:	**Physics Department**
College:	**College of Science**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. Credit hours: 2
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: 11th level /4th year
4. Pre-requisites for this course (if any)**:** **Solid State Physics (1) 2033201-4 and Statistical Physics 2033204-3**
5. Co-requisites for this course (if any)**:NONE**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	3	100%
2	**Blended**	0	0%
3	**E-learning**	0	0%
4	**Distance learning**	0	0%
5	**Other**	0	0%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	0
3	**Tutorial**	0
4	**Others** (specify)	0
	Total	**30**

B. Course Objectives and Learning Outcomes

1. Course 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

2. Course Main Objective

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.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**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
1.2	Outline the magnetic properties and magnetic categories of materials and describe the superconductivity theory in solids	K4
2	**Skills :**	
2.1	Develop simple models to determine the energy band structure and magnetic properties of materials and to classify them accordingly.	S3
2.2	Develop skill versatility in solving problems related to electrical and magnetic properties of solids.	S2
3	**Values:**	
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	V1
3.2	Use internet and computer skills to develop knowledge in solid state physics.	

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 **2- Classification of the materials according to the energy band structure:** ▪ Dielectrics ▪ Semiconductors ▪ Conductors.	8
2	▪ 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	4

	▪ theory of superconductivity ▪ Josephson effect ▪ Applications of superconducting materials.	
7	**Revision**	2
Total		**30**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Classify materials on the basis of band structure, and materials applications on the basis of conductivity or resistivity.	Lecture	Written exams Homework
1.2	Outline materials magnetic properties and magnetic categories and describe the superconductivity theory in solids.	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.	Problem solving Group discussion	Written exams Homework reports
2.2	Develop skill versatility in solving problems related to electrical and magnetic properties of solids.	Problem solving	Written exams Homework reports
3.0	**Values**		
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	Group discussion	Homework reports Essays
3.2	Use internet and computer skills to develop knowledge in solid state physics.	Group discussion	Homework reports Essays

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Activities	Periodically	10%
2	Midterm exam	6^{th}	30%
3	Short exam	9^{th}	10%
4	Final exam	12^{th}	50%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Six office hours per week reserved to students for faculty consultation and academic advice.

F. Learning Resources and Facilities

1.Learning Resources

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

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Lecture notes and PowerPoints presentations prepared by the lecturer

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student Feedback on effectiveness of Teaching	Students	Indirect
Evaluation of Teaching	Instructor Program coordinator Departmental council Faculty council	Indirect
Improvement of Teaching	Program leaders Relevant committee	Direct
Quality of learning resources	Students Instructor Faculty	Indirect
Extent of achievement of course learning outcomes	Program leaders Instructor	Direct
Course effectiveness and planning for improvement	Program leaders Instructor	Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department Council / Committee of academic development
Reference No.	
Date	**October 2, 2022**