هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	Solid state Physics lab
Course Code:	PHYS 491
Program:	B.Sc. in Physics
Department:	Department of Physics and astronomy
College:	College of Science
Institution:	King Saud University
Version:	2.0.0
Last Revision Date:	Sep 2023

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	**2(0+0+4)**				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered:	8th level / 4th year.				
4. Course general Description Experiments to be performed by the students: Hall Effect, Dielectric Constant, Electron diffraction, The temperature effect on the resistance of metal & semiconductor, Electron Spin Resonance (ESR), Semiconductor Thermo generator, Solar Cell, X-Ray Diffraction, X-ray Fluorescence.					
5. Pre-requirements for this course (if any): PHYS 371					
6. Co- requirements for this course (if any):					
7. Course Main Objective(s) 1. Explain the basic concept of solid state physics what such as crystal , lattice and reciprocal lattice etc. 2. Explain basic theories, such as band theory, difference between metals, semiconductors and insulators by doing the experiment. 3. Demonstrate the various physical properties such as electrical, magnetic, dielectric, thermo electrical, and structural properties of materials and how these properties are effected as a function of external parameter such as temperature, electric field and magnetic field. 4. Discuss the properties of materials which are used in various sensor development such as the resistance of metal platinum and that of semiconductors Si or Ge are used in developing the temperature sensors in measuring the temperature. 5. Perform correctly the calculations on some solid state laws such as: Hall Effect phenomenon in metals and semiconductors and find the carrier concentration 'n' and nature of electrical carriers in different materials. 6. Able to communicate results through written reports and oral presentations Carry out experiments with high safety specially when using the high voltage sources.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	0	0
2.	E-learning	0	0
3.	Hybrid • Traditional classroom • E-learning	0	0
4.	Distance learning	0	0

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	0
2.	Laboratory/Studio	52
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
	Total	52

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	To define the crystal structure using X-ray	K1	• Lecture • Debates	• Exams
1.2	To recognize how some materials interact with magnetic and electric fields	K2		
2.0	Skills			
2.1	To recognize the differences between dependent and independent variable	S1	• Lab demonstrations • Small group discussion	• Projects • Exams.
2.2	To explain some main phenomena in solid state physics	S2		
3.0	Values, autonomy, and responsibility			
3.1	Illustrate the observations as a graph.	V1	• Lab demonstrations • Debates	• Lab reports • Exams
3.2	operate software for data analysis	V2		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.3	Work as a team and acknowledge others' work.	V3		

C. Course Content

No	List of Topics	Contact Hours
1.	Hall Effect	4
2.	Dielectric Constant	4
3.	Electron diffraction	4
4.	The temperature dependence on the resistance of metal	4
5.	Electron Spin Resonance (ESR)	4
6.	Semiconductor Thermogenerator	4
7	Solar Cell	4
8.	X-Ray Diffraction	4
9.	X-ray Fluorescence	4
10.	Energy gap of a semiconductor	4
Total		40

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Pre-lab assignment	Weekly	10%
2.	Report	Weekly	20%
3.	Mid term exam	6th week	30%
4.	Final exam	From 13 to 14	40%

*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	Introduction to Solid state Physics, by Charles Kittle, 8th Ed., Publisher: Johns Willey & Sons
Supportive References	تجارب متقدمة في فيزياء الجوامد، د. عبد الرحمن العقل، د. زياد المصري
Electronic Materials	https://vlab.amrita.edu/index.php?sub=1&brch=282
Other Learning Materials	Internet sites relevant to the course

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A laboratory which accommodates 12 students.
Technology equipment (projector, smart board, software)	Whiteboard and Smart board
Other equipment (depending on the nature of the specialty)	Not applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students\ Peer Reviewer	Indirect \ direct
Effectiveness of students assessment	Students- Faculty	Direct
Quality of learning resources	students	Indirect
The extent to which CLOs have been achieved	Faculty	Indirect
Other	None	None

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

G. Specification Approval Data

COUNCIL /COMMITTEE	Physics Department's council
REFERENCE NO.	6th (1st term/1446)
DATE	22/05/1446