Course Specification
(Bachelor)

Course Title:	**Solid State Physics & Modern Physics Laboratory**
Course Code:	**PHY 1481**
Program:	**Bachelor of Science in Physics.**
Department:	**Physics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	4
Last Revision Date:	***26/09/2024***

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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: (Level 7/ Year 4)					
4. Course General Description:					
This course provides laboratory work at the advanced undergraduate level. The course emphasizes experimental techniques, procedures and formal report writing. Laboratory experiments reinforce or extend the work of the lecture portion of the course. The course includes experimental description of crystal and electronic structure, lattice dynamics, and optical properties of different materials.					
5. Pre-requirements for this course (if any):					
Solid State Physics, PHY 1361					
6. Co-requisites for this course (if any):					
7. Course Main Objective(s):					
• Observe and analyze physical data relevant to some of the experiments in solid state physics and Modern Physics. • Provide students with a thorough understanding of the basic concepts of physics and the methods scientists use to explore natural phenomena, including observation, hypothesis development, measurement and data collection, experimentation, evaluation of evidence, and employment of mathematical analysis. • Develop the student's mathematical ability to manipulate formulae and derive correct numerical solutions that can be measured in the real world. • Instruct students in the competent use of laboratory equipment to collect and record data, • Apply relevant mathematical models and perform required computations, and present the derived results as an application of a measured observation of the physical world.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	**0**
2.	**Laboratory/Studio**	**30**
3.	**Field**	**0**
4.	**Tutorial**	**30**
5.	**Others (specify)**	**0**
Total		60

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Recognize the scientific method of inquiry to draw conclusions based on verifiable evidence of crystallography.**	**K1; K2**	• Supervision by lab instructor • Submitting an individual lab report. Performing lab. experiments at the scheduled times.	▪ Participation. ▪ Report evaluation. ▪ Lab experiment check. ▪ Exams.
1.2	**Describe the theoretical bases of transport phenomena of charged carrier experiments.**	**K1; K2**	• Supervision by lab instructor • Submitting an individual lab report. • Performing lab. experiments at the scheduled times.	▪ Discussion. ▪ Report evaluation. ▪ Lab experiment check. ▪ Exams.

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.3	**Describe the theoretical bases of photoconduction process in semiconductors experiments.**	**K1; K2**	• Supervision by lab instructor • Submitting an individual lab report. • Performing lab. experiments at the scheduled times.	▪ Participation. ▪ Report evaluation. ▪ Lab experiment check. ▪ Exams.
2.0	**Skills**			
2.1	**Analyze experiments according to the plan besides the learning from lab lecture.**	**S1; S2**	• Using the multimedia and visual materials, Lab manual and the theoretical bases of the course. Interaction between students in the lab course community and discussions in the lab.	Analyze experiments according to the plan besides the learning from lab lecture.
2.2	**Explain and use information from the output of experiment to draw conclusions.**	**S2; S3**	Experiments setting up, data recording and calculations based on lab manual and lectures (co-requisites).	Explain and use information from the output of experiment to draw conclusions.
2.3	**Summarize conclusions and write reports.**	**S3; S4**	• Experiments setting up, data recording and calculations based on lab manual and lectures (co-requisites).	▪ Summarize conclusions and write reports.
2.4	**Communicate in a clear and concise manner orally, on paper and using IT for acquiring and analyzing information.**	**S4; S5**	• Lectures. • Class discussions. • Encourage students to use electronic mail and internal network for submitting homework and assignments. • Use digital library.	▪ Communicate in a clear and concise manner orally, on paper and using IT for acquiring and analyzing information.
3.0	**Values, autonomy, and responsibility.**			
3.1	**Show the collaboration and inter-professionalism in class discussions or team**	**V1, V2, V3**	• Small team tasks • Open discussion at classroom. • Office hours.	▪ Reports. ▪ Presentations. ▪ Participation.

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	works, as well as solve problems independently.			

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction.**	**10**
2.	**Experiment 1:** Diffraction of electron in a polycrystalline lattice (Debye-Scherrer diffraction).	**5**
3.	**Experiment 2:** Plank's constant (h)	**5**
4.	**Experiment 3:** Bragg reflection: diffraction of x-rays at a monocrystal.	**5**
5.	**Experiment 4:** Investigating the Hall effect in silver.	**5**
6.	**Revision.**	**5**
7.	**Experiment 5:** Recording the current-voltage characteristics of a CdS photoresistor.	**5**
8.	**Experiment 6:** Determination of the Specific Charge of the Electron.	**5**
9.	**Experiment 7:** Electron spin resonance (ESR).	**5**
10.	**Revision.**	**10**
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Class Activities (class quizzes, homework, solving problems, etc.....)**	**weekly**	**35 %**
2.	**Midterm Exam 1**	**6thweek**	**7.5 %**
4.	**Midterm Exam 2**	**11thweek**	**7.5 %**
5.	**Final Exam**	**15thweek**	**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	
Supportive References	-Laboratory Manual supplied by the Department of Physics.

	- Laboratory Manual is available at the website of the Department of Physics. Multimedia associated with The Labe manual and the relevant websites
Electronic Materials	**https://units.imamu.edu.sa/colleges/en/science/Pages/default.aspx**
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- **Classrooms.** - **Labs.**
Technology equipment (projector, smart board, software)	- **Classroom equipped with a whiteboard and a projector.**
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	- **Students** - **Second examiner**	- **Indirect (The students complete the evaluation forms at the end of term. Final exam is evaluated by the second examiner)**
Effectiveness of Students assessment	- **Instructors** -	- **Direct (exams, HW, project, …)**
Quality of learning resources	- **Faculty** - **Students**	- **Indirect (surveys)**
The extent to which CLOs have been achieved	- **Instructors** - **Program Leaders**	- **Direct (excel sheet)**
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Quality Unit-Physics Department**
REFERENCE NO.	**Department council No. 06**

DATE	**26/09/2024**