



2023

TP-153



Course Specification

— (Bachelor)

Course Title: Solid State Physics-1
Course Code: PHYS26472
Program: Physics
Department: Physics
College: Science
Institution: University of Bisha
Version: 3
Last Revision Date: 25 July 2023



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A. General information about the course:

1. Course Identification

1. Credit hours: 3

2. Course type

A. University College Department Track Others

B. Required Elective

3. Level/year at which this course is offered: 7th Level / 4th year

4. Course general Description

This course will present the basic concepts needed to understand the crystal structure of solids, their vibrational and thermal properties. It will consolidate the interpretation of theoretical and experimental data of crystalline structure and thermal properties.

5. Pre-requirements for this course:

PHYS26361 Modern Physics

6. Co- requirements for this course:

NA

7. Course Main Objective(s)

Recognize the types of crystalline structure and connect them to vibrational and thermal properties of solids.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	3	100%
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		
4.	Distance learning		





3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	45

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	Describe the crystal structure of matter.	K.2	Lectures	Written test Reports
1.2	Define the lattice vibrations and thermal properties of crystals.	K.2	Solve problems	Homework Quizzes
2.0	Skills			
2.1	Analyze the crystal structure of matter.	S.1	Lectures	Written test Reports
2.2	Solve problems related to the lattice vibrations and thermal properties of crystals.	S.1	Solve problems.	Homework Quizzes
3.0	Values, autonomy, and responsibility			
3.1	Exhibit self-learning skills independently.	V.2	Self-learning	Reports Presentation

C. Course Content

No	List of Topics	Contact Hours
1.	Periodic structure and symmetry of crystals: The crystalline state. Basic definition. The fourteen Bravais lattices and seven crystal systems.	4.5
2.	Elements of symmetry. Nomenclature of crystal directions and crystal planes: Miller indices. Examples of simple crystal structures.	4.5
3.	Interatomic forces and Chemical bonds Interatomic forces. Types of bonding (covalent, ionic, metallic bonding; hydrogen and van der Waals).	4.5





4.	X-Ray, Neutron, and Electron Diffraction in Crystals Generation and absorption of X-rays. Bragg law.	4.5
5.	Scattering from an atom Scattering from crystal.	4.5
6.	Reciprocal lattice. Brillouin zones.	4.5
7.	Neutron diffraction. Electron diffraction. Methods of structure analysis.	4.5
8.	Lattice vibrations and thermal properties Elastic properties of crystals; elastic waves. Models of lattice vibrations.	4.5
9.	Phonons specific heat	4.5
10.	Thermal conduction. Thermal expansion.	4.5
Total		45

Table: The matrix of consistency between the content and the learning outcomes of the course.

	Course Learning Outcomes				
	1.1	1.2	2.1	2.2	3.1
Topic 1	✓		✓		✓
Topic 2	✓		✓		✓
Topic 3	✓		✓		✓
Topic 4	✓		✓		✓
Topic 5	✓		✓		✓
Topic 6	✓		✓		✓
Topic 7	✓		✓		✓
Topic 8		✓		✓	✓
Topic 9		✓		✓	✓
Topic 10		✓		✓	✓

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework, quizzes, reports, and presentation.	1: 15	10 %
2.	First term exam	7: 8	20 %
3.	Second term exam	12:13	20 %





No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Final exam	End of Semester	50 %

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	<ul style="list-style-type: none"> - Elementary Solid-State Physics, M. A. Omar, Addison-Wesley, (1993). - Solid State Physics (an Introduction), 2nd Edition, Philip Hofmann, Wiley, (2015).
Supportive References	<ul style="list-style-type: none"> - Introduction to Solid State Physics, 8th Edition, Charles Kittel, Wiley, (2004).
Electronic Materials	<ul style="list-style-type: none"> - Blackboard. - PowerPoint presentations. - Digital library of University of Bisha https://ub.deepknowledge.io/Bisha
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities	Classrooms, Physics lab.
Technology equipment	Data show or smart board.
Other equipment	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Extent of achievement of course learning outcomes.	Teachers, students.	Direct (Final exams), Indirect (Questionnaire).
Effectiveness of teaching.	Teachers, students.	Indirect (Questionnaire)
Effectiveness of assessment.	Teachers, students.	Indirect (Questionnaire)
Quality of learning resources	Teachers, students.	Indirect (Questionnaire)
Quality of facilities available	Teachers, students.	Indirect (Questionnaire)
Fairness of evaluation	Peer reviewer.	Direct (Final exams reevaluation).





G. Specification Approval Data

COUNCIL /COMMITTEE	College of Science Council
REFERENCE NO.	20
DATE	17 August 2023

