

T-104 2022

# **Course Specification**

Course Title: Solid State Physics 2

Course Code: PHYS 463

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





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A. General information about the course:					
Course Identifica	ation				
1. Credit hours:	2(2+0+0)				
2. Course type					
a. University	College 🗆	Dej	partment⊠	Track	Others□
b. Required	Elective⊠				
3. Level/year at	which this course	e is	seventh level /	fourth year.	
offered:					
4. Course genera The course aims to in bands, Energy band g solids with radiations	al Description troduce students to Fo gap calculations. Magn 5.	ermi su Ietism i	irfaces, Energy le n solids and supe	evels in one dime erconductivity. Ir	ension, Energy Interaction of
5. Pre-requireme	ents for this cours	se (if a	any): 371phys		
6. Co- requireme	ents for this cours	se (if a	any):		
7. Course Main (	)biective(s)				

1- The student should be able to gain deep and detailed understanding of solid-state physics including the electronic, electrical, and magnetic properties as well as the interaction of light with solids

2-The student should be able to appreciate the physical laws governing solids.

#### **1. Teaching mode (mark all that apply)**

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	30	100%
2.	E-learning	0	0
3.	<ul><li>Hybrid</li><li>Traditional classroom</li><li>E-learning</li></ul>	0	0
4.	Distance learning	0	0

#### 2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
	Total	42





# 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	demonstrate a knowledge and broad understanding of solid-state concepts in energy bands and fermi surfaces and interaction with light.	K1	• Give extensive examples during lecture.	• Hold Class discussion, tutorial sessions.
1.2	Explain magnetic and superconducting properties of solids.	К2	<ul> <li>Give problem sheets to be discussed during lecture</li> </ul>	<ul> <li>Give quizzes, mid-term exam and final exam.</li> </ul>
2.0	Skills			
2.1	do quantitative calculations based on established theoretical models to determine energy gaps.	S1	Give extensive     examples during     lecture	Hold Class
2.2	demonstrate solving problems related to solid state physics.	S2	<ul> <li>Give problem sheets to be discussed during lecture and labs.</li> <li>assignments.</li> <li>Discussions in the classes</li> </ul>	discussion. Give Homework, mid-term exam and final exam.
3.0	Values, autonomy, and respon	sibility		
3.1	Write and present a short scientific paper on a published research work in solid state physics.	V1	Assignment	Group discussion and Presentation

#### C. Course Content

No	List of Topics	Contact Hours
1.	<ul> <li>Energy Bands</li> <li>Nearly free electron model</li> <li>Bloch functions</li> <li>Kronig-penney model.</li> <li>Wave equations of electrons in a periodic potential.</li> <li>Number of orbitals in a band.</li> </ul>	6
2.	<ul> <li>Fermi surfaces and metals</li> <li>Reduced and periodic zone scheme.</li> </ul>	6





### **D. Students Assessment Activities**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Midterm examination	Approx. 7	20%
2.	Second Midterm examination	Approx. 11	20%
3.	project	Approx.10	10%
4.	Homework	2-3 times	10%
4.	Final examination	From 16 to 18	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	<ol> <li>"An Introduction to Solid States Physics", C. Kittle, 8th Edition, John Wiley &amp; Son Inc (2005).</li> <li>The Oxford solid state basics, Steven H. and Simon, Oxford university press 2016</li> </ol>
Supportive References	<ol> <li>"Solid State Physics, Ashcroft &amp; Mermin", 1st Edition, Harcourt Asia Pte Ltd (1976).</li> <li>"Introduction to condensed matter Physics." Feng Duan &amp; Jin Guojun, (World Scientific, 2005).</li> </ol>
Electronic Materials	None
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 classroom which accommodates 25 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.	8 <sup>th</sup> (1 <sup>st</sup> term/1445)	
DATE	06/06/1445	

