The Hashemite University
Faculty of Science
Course Syllabus

Department of Physics

Course Title: **Solid State Physics** **Course Number:** 110102471
Pre-requisite: 110102331 **Credit Hours**: 3
Designation: Elective **Instructor**: Dr. Akram Aqili
Instructor's E-mail: akramaq@hu.edu.jo
Office Hours: 12:30-13:30(Sunday, Tuesday, Thursday)

Course Description (Catalog): Understanding fundamental ideas of solid state physics that will help the student for further study. Use theoretical models to relate at the atomistic level interactions with the diverse properties (electronic, optical and magnetic) of solid materials. To relate the study of solid state physics with modern technology.

Text Book: Introduction to Solid State Physics, Charles Kittle, 8th edition John Wiley & Sons.

References:

1- E**N.W. Aschcroft "Solid State Physics", Holt-s Aunders, LTD (1981).**
2- J.R. Christman "Fundamentals of Solid State Physics", John Wiley & Sons (1988).
3- M.A. Omar "Elementary Solid State Physics", Adison-Wesley Pub.Co. (1975)..

Major Topics Covered:

Topics	No.of Weeks	Contact Hours*
Crystal Structure	2	6
Reciprocal lattice	3	9
Crystal Binding	1	3
Phonons I. (Crystal vibrations)	3	9
Phonons II. (Thermal properties)	2	6
Free electron Fermi Gas	2	6
Energy Bands	2	6
Total	**15**	**45**

*Contact Hours include lectures, quizzes and exams.

- **Specific Outcomes of Instruction (Course Learning Outcomes):**

After completing this course units, the students will be able to:

	Course Learning Outcomes (CLO)	(SO*)
CLO1.	Understand the meaning of some major concepts applied in solid state physics: lattice translation vectors, Basis and the crystal structure.	(a),(e) (k)
CLO2.	To be able to describe the fundamental lattice types and some simple crystal structures.	(a), (e) (k)
CLO3.	Understand the concept of reciprocal lattice and its relation to the diffraction of waves by crystals.	(a), (e) (k)

	Course Learning Outcomes (CLO)	(SO*)
CLO4.	Vibrations of crystals with monatomic basis and two atoms per primitive basis.	(a), (k)
CLO5.	Understand how to find the heat capacity for solids.	(a), (k)
CLO6.	Understand the free electron model and use it to calculate the heat capacity of the electron gas	(a), (k)
CLO7	Understand Nearly free electron model and the energy bands	

*(SO) = Student Outcomes Addressed by the Course.

- **Student Outcomes (SO) Addressed by the Course:**

#	Outcomes Description Applied and Natural Sciences Student Outcomes	Contribution
(a)	an ability to apply knowledge of mathematics, science, and applied sciences	H
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to formulate or design a system, process or program to meet desired needs	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify and solve applied sciences problems	H
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of solutions in a globaland societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.	M

H=High, **M**= Medium, **L**=Low

Grading Plan:

First Exam:	25 points	--/--/2022
Second Exam:	25 points	--/--/2022
Home Work	10 points	
Final Exam:	40 points	To be announced later

General Notes:(Attendance Policy) students are expected to attend every class and arrive on time in compliance with HU regulations. In case you find yourself in a situation that prevents you from attending class or exam, you have to inform your instructor. If you miss more than 6 classes for the (Sunday, Tuesday, and Thursday model) or 4 classes for the (Monday and Wednesday Model), you cannot pass the course. Makeup excuses will be accepted only for very limited justified cases, such as

illness and emergencies. Changing your section without informing your instructors is not accepted at all.