

**TISHK INTERNATIONAL UNIVERSITY**  
**FACULTY OF EDUCATION**  
**Department of PHYSICS EDUCATION,**  
**2022-2023 Spring**  
**Course Information for PHYS 408 SOLID STATE PHYSICS**

<b>Course Name:</b>		SOLID STATE PHYSICS				
<b>Code</b>	<b>Regular Semester</b>	<b>Theoretical</b>	<b>Practical</b>	<b>Credits</b>	<b>ECTS</b>	
PHYS 408	8	3	-	3	4	
<b>Name of Lecturer(s):</b>	Muhammad Hisham					
<b>Teaching Assistant:</b>	---					
<b>Course Language:</b>	English					
<b>Course Type:</b>	Main					
<b>Office Hours</b>	9-10					
<b>Contact Email:</b>	muhammad.hisham@tiu.edu.iq					
	Tel:07503830159					
<b>Teacher's academic profile:</b>	PhD in Applied and Engineering Physics					
<b>Course Objectives:</b>	This course aims to: 1. Define and discuss types of solids and lattice vibrations in solids. 2. Explain solids crystal structure. crystallography and the reciprocal lattice. 3. Define and explain crystal systems and miller indices. 4. make students able to evaluate and analyse crystalline materials from XRD patterns.					
<b>Course Description (Course overview):</b>	his course examines classical and quantum models of electrons and lattice vibrations in solids, emphasizing physical models for elastic properties, electronic transport, and heat capacity. This course covers crystal structure, band theory, electronic conductivity, Wave diffraction, X-Ray and Neutron Crystallography and the reciprocal lattice, Crystal binding and elastic constant, Phonon (crystal vibration), Phonon (thermal properties), Energy band and Free Electrons in Metals. The course can prepare students for the more advanced level solid state course.					
<b>COURSE CONTENT</b>						
<b>Week</b>	<b>Hour</b>	<b>Date</b>	<b>Topic</b>			
1	3	29/1-2/2/2023	registration			
2	3	5-9/2/2023	introduction to the course			
3	3	12-16/2/2023	introductory to solid materials			
4	3	19-23/2/2023	types of solids			
5	3	26/2-2/3/2023	crystalline materials and their properties			
6	3	5-9/3/2023	crystal structure (lattice and basis)			
7	3	12-16/3/2023	importance of crystalline solids			
8	3	19-23/3/2023	types of crystals			
9	3	26-30/3/2023	XRD analysis			
10	3	2-6/4/2023	Midterm Exam			
11	3	9-13/4/2023	crystal system			
12	3	16-20/4/2023	lattice parameters or cell parameters lattice constant			
13	3	23-27/4/2023	Packing efficiency			
14	3	30/4-4/5/2023	miller indices			
15	3	7-11/5/2023	How to determine miller indecies			
16	3	14-18/5/2023	cubic system			
17	3	21-25/5/2023	Types of cubic system			
18	3	28/5-1/6/2023	Final Exam			
19	3	4-8/6/2023	Final Exam			
<b>COURSE/STUDENT LEARNING OUTCOMES</b>						
1	Students will be able to understand the difference between materials structure					
2	Students would be able to understand and material structure in the atomic scale and the effect of crystalline on materials.					
3	students would be able to determine lattice parameters and their effects on solid crystals.					
<b>COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES</b>						
(Blank : no contribution, I: Introduction, P: Profecient, A: Advanced )						

<b>Program Learning Outcomes</b>		<b>Cont.</b>	
1	Discuss concepts and principles of physics.	P	
2	Conduct proper experiments safely and interpret the data in physics teaching physics.		
3	Use the results of recent education and subject-specific developmental research when designing, implementing and justifying their own practice as a teacher.		
4	Apply analytical and theoretical skills to model and solve physics problems.	I	
5	Identify students' misconceptions and deal with them in classroom.		
6	Prepare physics lessons with appropriate learning materials and teaching methods.	I	
7	Effectively assess, plan, teach, organize, and manage physics classrooms.	P	
8	Use appropriate methods and techniques to improve students' critical thinking, creative thinking and problem-solving skills in physics.	I	
9	Use required modern methods and techniques for student-centered teaching by considering individual and cultural differences of students.		
10	Effectively use a variety of teaching technologies and techniques and classroom strategies to foster student learning.	I	
11	Communicate effectively and work collaboratively within the context of a global society.	I	
12	Exhibit character and decision-making skills embodying professionalism and ethical behavior.		
<b>Prerequisites (Course Reading List and References):</b>	ome knowledge of physics and chemistry. A basic knowledge of vectors, basic calculus, classic electro-magnetic phenomenon, and quantum mechanics are required, at the level of "Introduction to Quantum Mechanics", as is undergraduate statistical physics at the level of "Thermal Physics".		
<b>Student's obligation (Special Requirements):</b>	1. Notebooks are recommended and would be useful for lessons, activities and assignments related to the course. 2. If you are absent, it is your responsibility to gather the notes that you missed. 3. Assessments: Are varied in format and are related to the chapter readings, and lectures. 4. Absences: Students are responsible for all assignments/material missed due to absences. 5. A semester project developed by each student will be used to demonstrate knowledge and understanding of the material in the course. 6. I will act as a guide, a facilitator, and a resource advisor. I will always be available through e-mail. 7. To succeed, students must participate and complete all assignments and activities. This course requires the student's active participation. 8. Optional but useful: colored pens and/or pencils, ruler, calculator.		
<b>Course Book/Textbook:</b>	Elementary SOLID STATE PHYSICS: Principles and Applications, M. A. Omer, 1975 Introduction to Solid State Physics (8th Edition), Charles Kittel (John Wiley and Sons, 2005).		
<b>Other Course Materials/References:</b>	solid state and electronics journal		
<b>Teaching Methods (Forms of Teaching):</b>	Lectures, Presentation, Project, Assignments, , ,		
<b>COURSE EVALUATION CRITERIA</b>			
<b>Method</b>	<b>Quantity</b>	<b>Percentage (%)</b>	
Participation	1	5	
Quiz	2	10	
Project	1	15	
Midterm Exam	1	20	
Final Exam	1	40	
<b>Total</b>		<b>100</b>	
<b>Examinations:</b> Essay Questions, True-False, Fill in the Blanks, Short Answers, , ,			
<b>Extra Notes:</b>			
<b>ECTS (ALLOCATED BASED ON STUDENT) WORKLOAD</b>			
<b>Activities</b>	<b>Quantity</b>	<b>Workload Hours for 1 quantity*</b>	<b>Total Workload</b>
Theoretical Hours	19	3	57
Practical Hours	19	0	0
Final Exam	1	40	40
Participation	1	5	5
Quiz	2	10	20
Project	1	15	15
Midterm Exam	1	20	20
<b>Total Workload</b>			<b>157</b>
<b>ECTS Credit (Total workload/25)</b>			<b>6</b>

**Peer review**

Signature:  
Name:  
Lecturer

Signature:  
Name:  
Head of Department

Signature:  
Name:  
Dean