



Jordan University of Science and Technology
Faculty of Science & Arts
Physics Department

PHY473 Semiconductors Physics

First Semester 2023-2024

Course Catalog

3 Credit Hours. The aim of the course is to develop physics and engineering strategies of semiconductor materials and to discuss their functionalities in modern electronic and optoelectronic devices

Text Book

Title	Semiconductor Physics and Devices
Author(s)	D. A. Neamen
Edition	4th Edition
Short Name	1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
2	B. Van Zeghbroeck, Principles of Semiconductor Devices Web edition ? http://ece-www.colorado.edu/~bart/book/	B. Van Zeghbroeck,	3rd Edition	
3	Physics of Semiconductor Devices	S M Sze	2nd Edition	
4	www.pveducation.org , 2019.	C.B.Honsberg and S.G.Bowden,	19th Edition	

Instructor

Name	Dr. Adnan Shariah
Office Location	PH3 L1
Office Hours	
Email	shariah@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun, Tue, Thu : 11:30 - 12:30 Room: M3306

Prerequisites		
Line Number	Course Name	Prerequisite Type
922310	PHY231 Electronics (1)	Prerequisite / Pass

Tentative List of Topics Covered		
Weeks	Topic	References
Weeks 1, 2	1.1. Introduction 1.2. Quantum mechanics 1.3. Electromagnetic theory 1.4. Statistical thermodynamics	From 1
Weeks 3, 4	2.1. Introduction 2.2. Crystals and crystal structures 2.3. Energy bands 2.4. Density of states 2.5. Carrier distribution functions 2.6. Carrier densities 2.7. Carrier transport	From 1, From 2
Weeks 5, 6	2.8. Carrier recombination and generation 2.9. Continuity equation 2.10. The drift-diffusion model 2.11 Semiconductor thermodynamics 2.3. Energy bands 2.4. Density of states 2.5. Carrier distribution functions 2.6. Carrier densities	From 2, From 3
Weeks 7, 8	2.7. Carrier transport 2.8. Carrier recombination and generation 2.9. Continuity equation 2.10. The drift-diffusion model 2.11 Semiconductor thermodynamics	From 1, From 2
Weeks 9, 10	p-n Junctions 4.1. Introduction 4.2. Structure and principle of operation 4.3. Electrostatic analysis of a p-n diode	From 2, From 3
Weeks 11, 12	4.4. The p-n diode current 4.5. Reverse bias breakdown 4.6. Optoelectronic devices 4.7. Photodiodes	From 2
Weeks 13, 14	4.8. Solar cells 4.9. Light Emitting Diodes (LEDs) 4.10. Laser diodes	From 4
Weeks 15, 16	solar cell systems- Projects and performance	From 4

Mapping of Course Outcomes to Program Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
develop physics strategies of semiconductor materials and to analyze the characteristics and theories in semiconductor materials in terms of crystal structures, charge carriers and energy bands. [31]	45%	
Explains the working principle of a p-n junction. [11]	30%	
Describe the photovoltaic process and technology [11]	25%	

Relationship to Program Student Outcomes (Out of 100%)					
1	2	3	4	5	6
100					

Evaluation	
Assessment Tool	Weight
First Exam	30%
Second Exam	30%
Final Exam	40%

Policy	
Attendance	Attendance at the lectures is required
course materials	the lectures will sometimes cover material not in the textbook
course information	Organizational material for the course, including the course description and syllabus, the course calendar, and times of office hours and help sessions.
Office hours	You may visit me during office hours for any reason without an appointment. You can come at other times also, but make an appointment so that you can be sure to catch me. You can contact us by email

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