

## Faculty of Engineering & Technology

### Solid State Physics

**Information :**

**Course Code :** PHY 232

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Department of Electrical Engineering

**Instructor Information :**

Title	Name	Office hours
Associate Professor	Borham Mohamed Taher El adorously Ali eldin	
Assistant Lecturer	Nada El Said Abdallah Hassan Salem	

**Area Of Study :**

The objectives of the physics courses for the Engineering students during the third semester is to provide them with the basic fundamental theories of electronic quantum behavior of matter, beginning with the early quantum mechanics theories, the duality of particles and wave, the probabilistic uncertainty of finding a particle in a certain medium ending with the semi-conductors theories.

**Description :**

Special theory of relativity, Quantization and Max Planck's principle. Photoelectric effect, Uncertainty Heissenburg's principle, Wave function for an elementary particle, Schrodinger wave differential equation in one dimension (Eigen value Equation), Applications in an infinite potential well. Theory of free conduction electrons, Kroning and Penny model, Theory of semiconductors, Electrons and holes in semiconductors, P-N junction structures, and its energy band diagram

**Course outcomes :**

**a.Knowledge and Understanding: :**

1 -	1. Of special theory of relativity.
2 -	2. Of quantization and max plank's principle.
3 -	3. Of photoelectric effect.
4 -	4. Of uncertainty Heissenburg's principle.
5 -	5. Of wave function for an elementary particle.
6 -	6. Of Schrodinger wave differential equation in one dimension(Eigen Value Equation).
7 -	7. Of theory of free conducting electronics.
8 -	8. Of theory of semi-conductors

**b.Intellectual Skills: :**

1 -	1. Deal with physical problems.
2 -	2. Think logically and creatively.

**c.Professional and Practical Skills: :**

1 -	1. To gain skills in identifying and using the different physical parameters related to this course, and perform experiments related to these topics.
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2 - 2. To gain skills in constructing the physical laws and be able to solve the physical problems.

**d.General and Transferable Skills: :**

1 - 1. Work effectively in team.

2 - 2. Develop skills related to creations thinking, problem solving , oral and written presentation, and team work.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Special Theory of Relativity	10	6	2
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Photoelectric effect	7	3	2
Uncertainty Hissenburg's principle	7	3	2
Wave function for an elementary practical	6	2	2
Schrodinger equation in one dimension	6	2	2
Applications in an infinity potential well	6	2	2
Theory of free conduction electrons	7	3	2
Kroning and Penny model	6	2	2
Theory of Semi-conductors	10	6	2
Electrons and holes in Semi-conductors	6	2	2
P-N Junction structures	6	2	2
Energy band diagram	12	4	4
Revision	6	2	2

**Teaching And Learning Methodologies :**

Lectures

Practical sections

Assignments and homework

Working models

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Final Exam	40.00	16	
Lab	20.00	1	
Mid-Term Exam 1	15.00	6	
Mid-Term Exam 2	15.00	12	
Semester Work	10.00	1	

**Course Notes :**

handouts & notes

**Recommended books :**

- 1 College physics Giambattista and Richardson, Mac gramtill, 3rd edition, 2010.
- 2 Physics for scientists and engineers Serway, Thomson Brookes/Cok., 8th edition, 2011.