

EC210 Solid State Electronics

COURSE INFORMATION

Prerequisites	Academic Year & Level		Teaching Methods			Credit Hrs.
	Year	Semester	Lecture	Tutorial	Laboratory	
BA114	2	3	2	2	1	3

COURSE AIM

To present the basic physical concepts about the operational principles of crystalline solids.

COURSE WEEKLY CONTENTS

- 1 General introduction for the course contents and the grading system.
- 2 Atomic structure, Molecules and general bonding principles.
- 3 Types of crystals models.
- 4 Covalent Bond, Metallic Bond, Ionic Bond
- 5 Miller indices: crystal directions and planes.
- 6 The dispersion relationship of a mono atomic lattice vibrations, phase and group velocities.
- 7 Particles and waves
- 8 De Broglie relationship, time independent Schrödinger equation, Heisenberg's uncertainty principle.
- 9 Application on Schrödinger equation (Infinite potential well: A confined electron)
- 10 Application on Schrödinger equation (Tunneling phenomenon: Quantum leak)
- 11 Energy Band theory of solids: (energy bands, effective mass, concept of a hole) (Semiconductors) Intrinsic semiconductors (Si crystal and energy band diagram,
- 12 electrons and holes, conduction in semiconductors, electrons and holes concentrations).
- 13 (Semiconductors) Extrinsic semiconductor: (n-type doping, p-type doping, compensation doping) and carriers concentrations. Fermi energy level position.
- 14 Semiconductor conductivity and resistivity.
- 15 Semiconductors (Diffusion and conduction current equations).

STUDENT GRADING & ASSESSMENT

Weeks	Exams	Assign.	Quizzes	Reports	Present.	Lab.	Total
1 to 7	20 Midterm	←	10	MARKS		→	30
			To be freely distributed among possible assessments				
8 to 12	←		20	MARKS		→	20
13 to 15	←		10	MARKS		→	10
16 or 17	40	Final					40
Total	Exams	Assign.	Quizzes	Reports	Present.	Lab.	100

REFERENCES

Textbook • S. O. Kasap, Principles of Electronic Materials and Devices, 2nd Edition, McGraw-Hill

Other

- C. Kittel, Introduction To Solid State Physics, John Wiley and Sons