



SYLLABUS

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Language
PHY	472	Semiconductor Physics	3	2	0	2	5	PHY 324	8	English

A. Course Description

This course provides the basics and principles of semiconductor devices. The major objective is to familiarize the students with the basic principles of operation of modern semiconductor devices such as p-n junction diode, light emitting diodes, JFET transistor, bi-polar transistors, etc.

B. Course Outcomes

At the end of this course the student will be able to:

1. Provide undergraduate students with a wide background and the ability to deal with advanced concepts in semiconductor devices.
2. Describe the basic devices of semiconductor for the specific application.
3. Provide the different parameters of semiconductor devices.
4. Discuss aspects of the effects of semiconductors on the physical science.
5. Develop critical thinking and analytical problem-solving skills.

C. References

Required Textbook

Sze S. M., *Physics of Semiconductor Devices*, Wiley-Interscience (1969).

Other references

- Pierret R.F., *Semiconductor Device Fundamentals*, 2nd Edition (1996).
- Yu P.Y., and Cardona M., *Fundamentals of Semiconductors, Physics and Materials Properties*, 2nd Edition, Springer, Berlin, (1999).

Course Website: <http://www.imamm.org/>

D. Topics Outline

1. **Generalities on Semiconductors:** Introduction presents a summary of the physics and properties of semiconductors, energy bands in semiconductors, electronic structure; electrons in periodic structures, effective mass and semiconductor band gap (Contact hours: 12).
2. **Charge Carrier Population:** Intrinsic concentrations; doped semiconductors, N-type and P-type semiconductors, Fermi level at equilibrium (Contact hours: 10).
3. **Electrical Conductivity:** Carrier transport phenomena, Quasi-classical approach, carrier mobility for a non-degenerate electron gas, high field transport and hot carrier effects (Contact hours: 10).
4. **p-n junction:** Space charge distribution, electronic energy bands in the space charge region; p-n junction under an applied voltage; p-n junction capacitance (Contact hours: 10).
5. **Metal-Semiconductor Contacts:** Band structure and electronic properties, metal-semiconductor devices (Contact hours: 10).
6. **Transistors:** Bipolar transistor, JFET transistor (Contact hours: 8).



E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes & Homeworks:** During the semester.
- **Final Exam:** 16th week.

Your course grade will be based on your semester work as follows:

Midterm 1: 20 %	Midterm 2: 20 %	Final Exam: 40 %
Quizzes, Homework, Attendance & Participation: 20 %		

The grading distribution:

A ⁺	A	B ⁺	B	C ⁺	C	D ⁺	D	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[65, 70)	[60, 65)	[0, 60)

G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

[Executive Rules for Study Regulations and Exams](http://goo.gl/ykm7t3)

goo.gl/ykm7t3

