



IN214 Jan (was offered in Aug till 2016) 3:0

Semiconductor Devices and Circuits

Instructor

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Teaching Assistant

Email:

Department: Instrumentation and Applied Physics

Course Time:

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

The course is taken by Masters and Phd students working on electronic materials, devices and actively involved in semiconductor device and circuits research.

Prerequisites

None.

Syllabus

Unit I: Quantum Mechanics (Excursion)

Quantum Mechanics Fundamentals, Schrodinger Equation, Particle in a Box, Harmonic Oscillator

Unit II: Solid State Physics (Excursion)

Bonding, Crystals, Wigner Seitz Cell, Bragg's Law, Lattice Waves and Phonons, Reciprocal Lattice, Brillouin Zones, Kronig Penny Model, Formation of Energy Bands

Unit III: Semiconductor Fundamentals

Metals, Semiconductors - Density of States, Fermi Function, Carrier Concentrations and Mass Action Law, Doping, Recombination and Generation, Continuity Equation

Unit IV: Junctions

Metal Semiconductor Junctions, PN Junctions

Unit V: Transistors

BJT, JFET, MESFET, MOS Capacitor, MOSFETs, Small Signal Models, Single Stage Amplifiers Basics

Unit VI: Novel Semiconductors

Organic Semiconductors, amorphous silicon, metal oxides

Course outcomes

The concepts and analysis of semiconductor device physics.

Methods to develop novel semiconductor devices.

Impact of device physics on circuit design.

Grading policy

40% take home exam - mid term

20% presentation

40% in class open book exam - end term

Assignments

Resources