IN214 Jan (was offered in Aug till 2016) 3:0
Semiconductor Devices and Circuits

Instructor
Sanjiv Sambandan
Email: sanjiv@iisc.ac.in

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**