EE 614A, July 2017

Solid State Devices I

(Course Information)

Course Objectives:

- Develop strong background in semiconductor physics.
- Use this background to understand the operation of basic two-terminal and three-terminal semiconductor devices.

Course Contents:

- Introduction to Quantum Mechanics, crystal structures, real and reciprocal lattice and electronic bandstructures
- Basic Semiconductors Physics, Band-diagrams, Transport
- Two-terminal devices: p-n junctions, Schottky diodes and MOS Capacitor
- Three-terminal devices: Bipolar Junctions Transistors (BJTs) and Field Effect Transistors (FETs)

Instructor: Dr. Amit Verma (amitkver@iitk.ac.in)

Teaching Assistant: Nadeem Firoz (nadeem@iitk.ac.in)

Class Hours: Mondays and Thursdays 9.00 am – 10.15 am
Location: T211
Office Hours: Thursdays 4.00 pm – 5.00 pm, WL132

Grading:

Homework Assignments (20%): Assignments will be given every 1-2 weeks and should be submitted before class on due date; Late submission by one/two days will invoke penalty of 25/50% on marks scored. Assignments will not be accepted later than 2 days after the due date (no exceptions). You are allowed to work with other students in the class on homeworks but what you submit must be in your handwriting and have your own plots and figures. No marks will be given for copied submissions (Disciplinary action will be taken in such cases)

Quizzes (20%): Two quizzes of 1 hour duration; No makeup quiz will be taken

Mid-Semester Exam (25%): One mid-semester exam of two hour duration

End-Semester Exam (35%): One end-semester exam of three hour duration.

Attendance: 100% attendance is compulsory. Any student who is granted leave by the Convener, DPGC also must inform the instructor regarding his/her absence.

Books: Students should take notes in the class. Handouts will be given in class from time to time for additional reading. There are no required texts but following books are recommended:

- Introduction to Solid State Physics (Charles Kittel)
- Solid State Electronic Devices (Ben G. Streetman and Sanjay Banerjee)
- Semiconductor Devices and Circuits (Aloke K. Dutta)
- Introduction to Quantum Mechanics (David J. Griffiths)
- The Physics of Low-Dimensional Semiconductors (John H. Davies)

Software:

- 1D Poisson (Prof. Gregory Snider-Notre Dame, http://www3.nd.edu/~gsnider/)
- Matlab, Mathematica, Mathcad …