ECE609 Semiconductor Devices
Spring 2010

Day and Time: MWF 10:10-11:00
Place: ELAB 306
Prerequisite: ECE344 or equivalent undergraduate course
Instructor: prof. Massimo (Max) Fischetti
Office: Marcus 201D
Office Hours: TuTh 2:30-3:30

Textbook: There will be no textbook. Lecture Notes will be posted on the course web site.


Grading: Homework 30% (6-to-8 homework assignments due approximately every 2 weeks)
Midterm 30%
Final 40%

Purpose of the Course:
- Provide the foundations to understand the electronic properties and the physics of charge transport in semiconductors
- Explain the operating principles semiconductor devices
- Give an outline of the technology and material science needed to manufacture VLSI semiconductor devices

Outline:
1. Review of Quantum Mechanics
2. Crystals
3. Energy Bands in Solids
4. Statistical Mechanics of Electrons and Holes in Semiconductors
5. Theory of Charge Transport in Solids: Phonons, Scattering, Dielectric Screening and the Boltzmann equation
6. Generation and Recombination Processes
7. Device Equations
8. Heterojunctions and Diodes (PN Junctions)
9. Metal-Semiconductor Contacts
10. JFET and MESFET
11. MOS Capacitor
12. MOSFET
13. Bipolar Transistors
14. Heterojunction Devices
15. Quantum Effect Devices
16. Semiconductor Processes