Instructor: Dr. Jim P. Zheng
Room 350
Lecture Hours: MWF 11:50-12:40
Office Hours: MW 2:50-3:50pm
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Prerequisites: EEL3300, or equivalent (grading C or better)


Course Topics:
- Introduction to Background on the nature of semiconductors and conduction processes in solids
- Quantitative analysis of the carrier concentration, distribution, and action in semiconductors
- Introduction to semiconductor fundamentals of devices including pn-junction diodes, photodiodes, solar cells, LEDs, BJTs, J-FETs, and MOSFETs.

Instructional Objectives:
At the conclusion of this course, students should be able to
1. Describe crystal properties and growth of semiconductors
2. Apply basic quantum mechanics to atomic and semiconductor models
3. Derive equations of charge transport in semiconductors under normal operating conditions
4. Determine charge, electric field, and potential distributions, and energy band diagrams in pn-junction diodes under normal operating conditions
5. Apply charge diffusion equation to pn-junction diodes and bipolar junction transistors, and derive i-v characteristics for diodes and transistors, and small-signal admittance and transient response for diodes
6. Derive i-v characteristics of field effect transistors
7. Discuss the fundamental applications of photodiodes, solar cells, and light-emitting diodes
8. List fabrication steps used in production of pn-junction diodes and various types of transistors
Grading: Two Examinations: 50% (25% from each exam)
Homework: 10%
Final Examination: 40% (a comprehensive exam)
Attendance and Quizzes: 5% (bonus points, no credit will be awarded if one missed more than 3 lectures)

Grading scale: A: >90%, B: 80-89%, C: 65-79%, D: 50-64%, F: <49%
These breakpoints may be lowered slightly depending on overall class performance.

Policy Statements:
• Attendance is mandatory.
• Homework is due at the beginning of class.
• The general policy is no makeup exams and quizzes. In the event of an excused absence, you must notify the instructor prior to the exam to discuss proper procedure.
• Cellular phones and beepers must be turned off in the classroom.
• Coming late or leaving early will be considered as the absence of class.
• There is renewed emphasis on the Honor Code. Violation of this code can result in course failure and/or dismissal from the College of Engineering.