Instructor: Dr. Jim P. Zheng  
Room 346  
Lecture Hours: MWF: 11:55am-12:40pm  
Office Hours: MW: 3:00-4:00pm  
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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: 2 Midterm Examinations: 40% (20% from each exam)
Homework: 15%
Projects: 20%
Final examination: 25%

Grading scale: A: >90%, B: 80-89%, C: 60-79%, D: 45-59%, F: <45%
These breakpoints may be lowered slightly depending on overall class performance.

Policy Statements:
• Attendance is mandatory.
• Coming late (5 minutes) or leaving early (5 minutes) will be considered as the absence from class.
• 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.
• 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.