EEL4351 **Solid State Electronic Devices** **Fall 2002**

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)

Textbook: Robert F. Pierret, Semiconductor Devices Fundamentals, Addison-Wesley Publishing Co., Reading, Massachusetts, 1996.

References: Ben G. Streetman, Solid State electronic Devices, 4th ed. Prentice Hall, New Jersey, 1995.

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-juctuion 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.