Course Description
EE 3329 Electronic Devices

2000-2002 Catalog Data: Energy band models, electron and hole concentrations and transport, p-n junction, bipolar junction transistors, and field effect devices. PHYS 3325, Modern Physics; EE 3321, Electromagnetic Field Theory with grade of "C" or better.

Prerequisites by Topic:
1) Electric and Magnetic Fields
2) Time-varying fields and Maxwell's Equations
3) Motion of charged particles in electromagnetic fields
4) Introductory quantum mechanics
5) Interference and theory of waves
6) Integro-differential calculus
7) Differential equations


Topics Covered:
1) Crystal structure and growth (2 hours)
2) Epitaxy, diffusion and ion implantation (1 hour)
3) Energy bands in crystals (6 hours)
4) Carrier transport in semiconductors (6 hours)
5) p-n junction diodes (12 hours)
6) bipolar junction transistors (6 hours)
7) field effect devices (10 hours)

Course Outcomes: Students shall be able to:
1. apply fundamentals of semiconductor physics to the understanding of electronic devices (Critical).
2. use ordinary differential equations (ODEs) to solve engineering problems in semiconductors (Critical).
3. apply their understanding of the behavior of semiconductor devices (pn junctions, BJTs, and field effect devices) in designing variations of those devices for special applications (Important).
4. identify the best semiconductor and device parameters to make the best device for a specific application, incorporating design constraints (Important).
5. demonstrate competence in written technical communication (Relevant).

Class Schedule: Three hours of lecture per week.

Contribution to Professional Component: EE 3329 is a junior required course which gives all students the background to work in the field of semiconductors and semiconductor devices. It forms the basis (pre-requisite) for senior elective EE 4350, Integrated Circuits and Semiconductor Devices.

Relationship to Program Outcomes:
3a. Have an ability to apply knowledge of mathematics, science, and engineering...

Gives students opportunities to extensively apply mathematics, physics, and chemistry principles to solve device physics and fabrication problems.

3b. Have an ability to design a system or component to meet desired needs...

Students actually design electronic devices to meet stated needs.
3c. Have an ability to identify, formulate, and solve engineering problems.

Students solve many problems as homework and on exams which are engineering problems.

3i. Have an ability to communicate effectively.

Students turn in technical documents such as memos and reports to instructor to document efforts in designing electronic devices.

Relationship to Educational Outcomes: Heavily weighted to Outcomes 3a and 3c which heavily influence our Educational Objectives 1 and 2, but there is also a written communication component. It is estimated that 40% of the course time and student effort is directed toward achievement of each of Objectives 1 and 2, and the remaining 20% supports achievement of Objective 3.

Computer usage: None.

Prepared by Dr. Gregory B. Lush, Associate Professor of ECE, January 28, 2001