

## EEO331: Semiconductor Devices

Spring 2014

### 2013-2014 Catalog Description:

The principles of semiconductor devices. Energy bands, transport properties and generation recombination phenomena in bulk semiconductors are covered first, followed by junctions between semiconductors and metal-semiconductor. The principles of operation of diodes, transistors, light detectors, and light emitting devices based on an understanding of the character of physical phenomena in semiconductors. Provides background for subsequent courses in electronics.

**Course Designation:** Required

**Text Book:** Donald A. Neamen, "An Introduction to Semiconductor Devices", McGraw Hill, 2006, ISBN 9780072987560

**Prerequisites:** Calculus IV (differential equations) and Physics II

### Goals:

To teach properties, models, and concepts associated with semiconductor devices. Provides detailed insight into the internal workings of basic semiconductor devices such as the pn-junction diode, Bipolar Junction Transistor, and MOSFET. Systematically develops the analytical tools needed to solve practical device problems

### Course Learning Outcomes:

1. Course Learning Outcome	POs	Assessment Method
2. knowledge of semiconductor bonding and energy band models	a	Exams, final, and homework
3. knowledge of semiconductor carrier properties and statistics	a	Exams, final, and homework
4. knowledge of semiconductor carrier action	a	Exams, final, and homework
5. ability to apply standard device models to explain/calculate critical internal parameters and standard characteristics of the pn-junction diode	a,e	Exams, final, and homework
6. ability to apply standard device models to explain/calculate critical internal parameters and standard characteristics of the Metal-Oxide-Semiconductor Field Effect Transistor	a,e	Exams, final, and homework
7. ability to apply standard device models to explain/calculate critical internal parameters and standard characteristics of the Bipolar Junction Transistor	a,e	Exams, final, and homework

