Fundamentals of Semiconductor Devices

ECE 6531

Credit Hours:
3.00 - 3.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
An overview of the physics, design, and engineering of semiconductor electronic and optoelectronic devices. Applications of silicon, compound semiconductor, and nanotechnology will be covered.

Prerequisites and Co-requisites:
Prereq: 5530 (730), or permission of instructor.

Course Goals / Objectives:
• Learn advanced semiconductor device physics.
• Learn to design semiconductor devices.
• Learn performance limits of state-of-the-art semiconductor devices and approaches for overcoming them.
**Course Topics:**
- Device applications of semiconductors
- Transport in heterojunctions
- Photodiodes and optoelectronic integrated circuits
- Solar cells - an introduction
- Light-emitting diodes
- Laser diodes - an introduction
- Heterojunction FET - HEMT
- Long-channel MOSFET models
- Sub-micron MOSFET - threshold volt, sub-threshold current, scaling, hot carriers
- Bipolar junction transistors
- Heterojunction bipolar transistors
- Tunnel diodes, resonant tunneling diodes
- Wide-bandgap semiconductors - transport physics and optical properties
- High-frequency and high power wide-bandgap electronics
- Optical devices based on wide-bandgap semiconductors

**Designation:**
Elective