

ECE4451 Course Syllabus

ECE4451

Semiconductor Devices for Wireless & Fiber Communication (3-0-3)

Prerequisites

ECE 3080/3450

Corequisites

None

Catalog Description

Advanced development of semiconductor device theory focusing on optoelectronic emitters, detectors, & high frequency transistors to provide an understanding of devices used in communications systems

Textbook(s)

Bhattacharya, *Semiconductor Optoelectronic Devices* (2nd edition), 1998. ISBN 9780134956565 (required)

Topical Outline

- I. Basics of Optoelectronics
 - A. Absorption & emission of radiation
 - B. Generation & recombination events
 - C. Absorption length & spectral coverage
- II. Optoelectronic Emitters
 - A. LEDs
 - B. LASERS
 - C. Flat panel displays
- III. Optoelectronic Detectors
 - A. Photoconductors
 - B. MSMs
 - C. Photodiodes
 - D. APDs
 - E. Schottky diodes
- IV. Basics of High Frequency, High Power Devices
 - A. Basic transport issues
 - B. Nonstationary transport - velocity overshoot
 - C. Heterojunctions
 - D. Wide band gap semiconductors
- V. Heterojunction Bipolar Transistors
 - A. HBT operation
 - B. Phototransistors
 - C. High frequency operation
- VI. Field Effect Transistors
 - A. MESFET operation
 - B. GaAs MESFETs

- C. High Frequency MESFETs
- D. HEMTs