Course description: Basic operating principles of various types of optoelectronic devices that play important roles in commercial and communication electronics; light-emitting diodes, injection lasers, and photodetectors.

Additional Class Details: Units: 3  Component: Lecture  Session: Session C

Prerequisites: EEE 352


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Goals: This course is designed to provide senior undergraduate students and junior graduate students background in a basic understanding of the principles and practices of modern optoelectronic devices and their important functions for applications in optical communication, sensing, imaging, and solar electricity generation. Practical skills in semiconductor optoelectronic device design, fabrication, and characterization will also be acquired.

Topics:

1. WAVE NATURE OF LIGHT
2. DIELECTRIC WAVEGUIDES AND OPTICAL FIBERS
3. SEMICONDUCTOR SCIENCE AND LIGHT EMITTING DIODES
4. STIMULATED EMISSION DEVICES: OPTICAL AMPLIFIERS AND LASERS
5. PHOTODETECTORS AND IMAGE SENSORS
6. SOLAR CELLS
7. POLARIZATION AND MODULATION OF LIGHT
8. APPLICATIONS

Exams: There will be 2 midterm exams and a final exam.

Lab tour: There will be a tour to MBE, MOCVD, materials and device characterization labs, through which the students will learn how semiconductor wafers are grown using molecular beam epitaxy (MBE) or metal organic chemical vapor deposition (MOCVD), how optoelectronic devices such as laser diodes, photodetectors, and solar cells are fabricated and tested.