Course Topics

EEE 598: Optoelectronic Devices

Prerequisites: EEE 434 or 436, 531 or 537, or other equivalent courses for students from other disciplines such as physics and materials engineering.

Catalog Course Description: This course is designed to provide junior and senior graduate students detailed background in semiconductors optoelectronic devices such as light emitting diodes, lasers, photodetectors, and solar cells. The applications of these devices will also be discussed.

Course Topics:

1. **Semiconductors and their electronic and optical properties** (element and compound semiconductors, semiconductor statistics, effective mass theory, carrier generation and recombination, etc.)
2. **Advanced junction theory** (PN junctions, tunnel junctions, Schottky barriers, and ohmic contacts, and heterojunctions)
3. **Light emitting diodes** (electroluminescence processes, photon recycling effect, light extraction, and device characterization)
4. **Laser diodes** (theory of laser diodes, double-heterostructure lasers, QW lasers, direct modulation of laser diodes, etc.)
5. **Photodetectors** (photoconductors, photodiodes, avalanche photodiodes, noise in photodetectors, and detection limits)
6. **Solar cells** (thermodynamic limits, single and multi-junction solar cells)
7. **Applications** (Optical communication, concentrating photovoltaics, IR imaging systems, etc.)