THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Lasers

ECE 5131

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Atomic interaction with radiation, cavities with gain, optical processes in semiconductors, strain in laser design, diode lasers, and advanced semiconductor lasers.

Prerequisites and Co-requisites:
Prereq: 3010 and 3030, or Grad standing in Engineering, Biological Sciences, or Math and Physical Sciences.

Course Goals / Objectives:
- Master physics of emission, absorption, and optical gain
- Master physics of optical resonators, with and without gain
- Master dynamics of lasing
- Be competent in understanding gain and lasing in semiconductor lasers

Course Topics:

- Review of electromagnetics
- Coherence
- Optical processes in semiconductors
- Strain in laser design
- Dispersion and attenuation
- Resonant cavities
- Einstein coefficients, lineshape
- Optical amplification and lineshape broadening
- Lasing dynamics, gain saturation
- Review of density of states, quasi-Fermi levels
- Semiconductor materials for diode lasers
- Double-heterojunction semiconductor lasers
- Gain-guided and index guided semiconductor lasers
- Quantum well lasers
- Strained quantum well lasers
- Strained quantum dot lasers
- Advanced semiconductor lasers

Designation:

Elective