THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Photonics

ECE 5132

Credit Hours:
3.00

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

Course Components:
Lecture

Course Description:
Fiber optics, optical systems and devices, optical detection, photonic band gaps, holography, and optical data storage.

Prerequisites and Co-requisites:
Prereq: 3010, 3010.01, or 3010.02, and 3030 or 3030.01; or Grad standing in Engineering, Biological Sciences, or Math and Physical Sciences.

Course Goals / Objectives:
- Master principles of fiber optics, including optical modes, attenuation, and dispersion
- Become competent physics of electromagnetic optics
- Master guided optical beams, Gaussian beams
- Master states of optical polarization, including the Poincare sphere and Jones calculus
- Become competent using paraxial ray matrices for analyzing imaging systems
- Become familiar with the physics of holography
- Become competent in designing photonics crystal optics

Course Topics:

- Wave propagation in isotropic media
- Polarization and Jones calculus
- Imaging, rays, and paraxial ray matrices
- Lenses, aberrations
- Electromagnetic optics
- Fiber optics, intermodal dispersion, waveguide and chromatic dispersion
- Beam optics, Gaussian beams
- Resonator optics
- Guided wave optics, guided optical beams, modes in cylindrical waveguides
- Link budgets
- Holography
- Optical data storage
- Photonic crystal optics, photonic band gaps

Designation:

Elective