

ECE 4362: Modern Optics for Engineers

Credit / Contact hours: 3 / 3

Course coordinator: Ayrton Bernussi

Textbook(s) and/or other required material: *Introduction to Optics*, Frank L. Pedrotti, S.J., Leno S. Pedrotti, and Leno M. Pedrotti, Pearson-Prentice Hall, 3rd Ed., 2007, ISBN: 0-13-149933-5

Catalog description: Modern concepts in optics related to engineering applications. Geometrical optics, matrix methods in optics; Polarization, interference, coherence, and lasers; Fourier optics, Fresnel and Fraunhofer diffraction.

Pre-requisite(s) or co-requisite: ECE 3323, ECE 3342

Designation: Elective

Course learning outcomes: Upon completion of this course, students should be able to do the following:

1. To analyze and design basic optical systems using ray tracing and ray matrix methods
2. To use scalar and vector analysis to solve simple problems involving propagation of light in different structures
3. To solve problems involving optical interference and diffraction
4. To solve problems involving polarization and coherent and non-coherent light sources.

ABET Student Outcomes addressed: a, e, and k.

Topics covered:

Nature of light– 1 hour

Wave equations – 2 hours

Superposition of waves –3 hours

Geometrical optics – 4 hours

Matrix methods in paraxial optics - 4 hours

Interference of light -3 hours

Coherence - 3 hours

Properties of lasers – 3 hours

Fresnel and Fraunhofer diffraction - 4 hours

Fourier Optics – 4 hours

Polarization – 2 hours

Modern topics in optics – 5 hours

Tests and reviews - 4 hours