

Syllabus
Physics 47 Optics
Department of Physics and Astronomy
Dartmouth College
Fall 2022

Instructor: Andrew Cupo

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Office: Wilder 201

Office Hours: MWF after lectures 12:35-2, or email for appointment

Teaching Assistant: Pradipta Debnath

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Class Hours: MWF 11:30-12:35 in Wilder 102

X-Hours: Tues 12:15-1:05 in Wilder 102 (Only used as needed – I will tell you ahead of time)

Textbook: Introduction to Optics 3rd Edition by Pedrotti, Pedrotti, and Pedrotti

Course Outline (Flexible): We will cover a selection of topics across geometrical, wave, and electromagnetic optics with a focus on both theory and applications. The formally listed prerequisites are introductory electromagnetism and vector calculus. Here is a rough outline of the topics we will cover (as time permits):

I. Overview

Nature of light (Ch 1)

II. Geometrical Optics

Introduction to geometrical optics (Ch 2)

Optical instrumentation (Ch 3)

III. Wave Optics

Wave equation (Ch 4)

Superposition (Ch 5)

Interference (Ch 7)

Interferometry (Ch 8)

Fourier analysis and coherence (Ch 9)

Diffraction (Ch 11, 12, 13)

IV. Electromagnetic Optics

Polarization (Ch 14, 15)

Fresnel equations (Ch 23)

Optical properties of materials (Ch 25)

V. Special Topics
Lasers (Ch 6, 26, 27)
Non-linear optics (Ch 24)

Grading Breakdown:

Homework: 40%
Laboratories: 20%
Midterm: 20%
Final: 20%

There will be approximately seven homework assignments during the term. Please let me know ahead of time if you need an extension. Late homework may be penalized.

There will be four laboratories during the term: (i) survey of interesting phenomena in optics (ii) microwave optics (iii) interferometry (iv) diffraction and Fourier optics

Honor Code:

This course is subject to Dartmouth's Academic Honor Principle. You are permitted to discuss homework problems and laboratory reports with your colleagues, but you must craft your own unique documents.

Special Accommodations:

Please arrange with me in advance if you need special accommodations for disabilities, religious observances, or any other reason.