

Physics 331: Optics Laboratory

Based on Autumn 2017 as taught by Jason Detwiler

Overview

Physics 331 is laboratory course on physical optics. Students work in groups of 2-3 on a collection of experiments concerning interference and diffraction, polarization, light propagation, and reflection. Weekly lectures give an overview of relevant theory, but the lecture sequence is not synchronized with the lab experiments.

Evaluation

The grade is based on lab reports, homework, pre-lab assignments, and lecture-related questions (assigned before or during lecture), and one end-of-term exam.

Texts

Required: Optics, 5th edition, Eugene Hecht (2017).

Labs: Lab instructions and additional information are delivered online.

Lecture topics

1. Course information; speed of light; experimental uncertainty
2. Light propagation
3. Polarization
4. Coherence and interference
5. Fourier spectroscopy; lasers
6. Single-slit diffraction
7. Gratings and holography

Experiments

- Speed of Light with a pulsed laser
- Concave Diffraction Grating & hydrogen-deuterium spectrum
- Fabry-Perot Interferometer & laser mode structure
- Michelson Interferometer & Fourier transform spectroscopy
- Fraunhofer and Fresnel Diffraction
- Reflection from an Air-Dielectric Interface
- Faraday Rotation & dispersion
- Holography