

Course Syllabus Spring 2010

Course Title: Optics
Course No: PH341-01
Times: MWF 9-9:50 MG244

Credit Hours: 3

Instructor: Dr. Probst
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Office Hours: TWR 1:30-2:30 p.m.

Course Description:

Optics is primarily a **theoretical** course with some application to optical design. The course focuses on physical optics including the Fresnel Laws of refraction and reflection, interference, Fourier analysis and diffraction. A short discussion of geometrical optics will also be included. This course is required for degrees in Physics, Physics Education, and Engineering Physics. Prerequisites: PH231/031; MA245.

Course Objectives:

- To learn the fundamental principles of classical physical optics.
- To learn the mathematical techniques employed in physical optics.
- To use these principles and techniques to solve problems in optics.
- To become familiar with the ray-tracing program BEAM-2 used in optical design.

Program Outcomes Addressed:

- (a) an ability to apply knowledge of mathematics, science, and engineering.
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- (e) an ability to identify, formulate, and solve physics and engineering problems.
- (g) an ability to communicate effectively.
- (i) a recognition of the need for, and an ability to engage in life-long learning.
- (j) a knowledge of contemporary issues.
- (k) an ability to use the techniques, skills, and modern tools necessary for physics and engineering careers.

Text: Eugene Hecht, *Optics*, 4th ed., Reading, MA: Addison Wesley Longman, 2002.

Expectation of Students:

- Read textbook assignments.
- Participate in class discussions.
- Perform acceptably on homework and tests.
- Conduct the necessary research and give 15 minute talk on a contemporary topic in optics.

Student Evaluation:

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| Quizzes/Homework | 20% |
| Tests | 40% |
| Final | 20% |
| Talk | 20% |

Course Outline:

| <u>Chapter</u> | <u>Topic</u> | <u>Approx. Class Hours</u> |
|----------------|--------------------------------|----------------------------|
| 1 | A Brief History | 0 |
| 4, 5, 6 | Topics in Geometrical Optics | 6 |
| 2 | Mathematics of Wave Motion | 3 |
| 3 | Electromagnetic Theory | 5 |
| | Test 1 | 1 |
| 4 | Propagation of Light | 4 |
| 7 | Superposition of Waves | 6 |
| 8 | Polarization & Birefringence | 5 |
| | Test 2 | 1 |
| 9 | Interference | 2 |
| 10, 11 | Diffraction and Fourier Optics | 6 |
| | Talks | 4 |

The Final Exam is scheduled for Wednesday, 12 May 2010 at 8:00 a.m.