

Physics 352: Optics

Prof.: Amy Sullivan
Office: Science Center, 107W
Phone: 404-471-6469
email: asullivan@agnesscott.edu

Text: *Optics, 4th edition*, Eugene Hecht

Prerequisite: PHY 111

This is an introductory course in classical and modern optics. Classical topics will include geometrical optics, diffraction, interference and polarization. Modern optics topics will be adapted to the interests of the students and may include topics such as lasers, nonlinear optics, or lidar.

Use of Blackboard/Course Website: All course materials and assignments will be available in Blackboard for this course.

Office hours: Tuesday 10:30 – 11:30 AM, Friday 9 – 10 AM

Feel free to communicate with me by email, or to set up an appointment at any other time other than Thursdays. Thursdays are my research days and I will not be available. You are also welcome to stop by other times, but I may be interrupted by other obligations at those times.

Grading:

25% Problem Sets

25% Labs

15% Projects

15% Midterm Exam

20% Cumulative Final Exam

Late Policy. Unless prior arrangements are made, late assignments will be accepted with a 10% penalty per calendar day, up until the time graded assignments are returned and solutions are posted. Graded homework and labs will generally be returned within one week of its due date. The lowest problem set score will be dropped at the end of the semester.

Problem-solving. Solving problems is critical to increasing expertise in physics. Collaboration is also a good way to increase understanding of a topic. Problems will be assigned regularly, in coordination with the in-class work. You may work together and use other resources to assist with the problems, but should write an individual solution to turn in. Solutions will be posted on Blackboard after graded assignments are returned, to help you review the material.

Problem sets may include setting up problems, solving the problem conceptually or with a numerical result, or writing a qualitative interpretation. Questions should be answered in clear, complete sentences. Show all the steps in the problems and explain any assumptions you make in your problem solving. Most of the credit for the problem will be for the method and explanation.

Experiments. While the field of optics is deeply rooted in electromagnetic theory, it is generally possible to explore the introductory topics in optics with simple lab experiments. We will be doing frequent laboratory experiments in this class. There will not be detailed lab reports, but you will be expected to keep a formal lab notebook for your observations and analysis. Since we do not have a dedicated laboratory session for this course, we will begin the experiments in class, but you will also need to schedule out-of-class time to complete the experiments, analyze the data and summarize your findings. You will be allowed access to the lab by a door code, but *please* keep the code confidential for your safety and the safety of the equipment.

Exams. There will be two exams in this class, one midterm exam and a final. These will include material from class, your problem sets, labs and projects.

Projects in Modern Optics

We will not be able to cover all the topics in Modern Optics, or even very many at all, and so your project will allow you to explore an area of Modern Optics that we do not cover in class. This will be a significant project and a significant part of your grade. You will summarize your project in an 8 – 10 page journal style paper. You will also give a half-lecture in class to teach us all about your topic. This can include demos or applets online.

The topic and method of your project is up to you. You may investigate some modern optical technology and explain to the class how it works. You may look up a recent article in *Optics Express* (free online optics journal) on a topic of interest in optics, read it, rederive the results of it, and then present and explain the paper. Or you may do an optics experiment and set up a mini-lab to do with the class.

Whatever your project, you must write a brief proposal outlining what you plan to accomplish with your project. The due date for this proposal will be posted on the assignments page, but will likely be in early February.

Online Course Evaluations

The completion of course evaluations is an expectation of students in this class. Near the end of the semester you will be notified by e-mail and provided with a link to follow to complete the evaluations on line outside of class. Your feedback on the course is extremely valuable to me. I take your comments very seriously and will use them for future course improvements.

I am a new professor and this is a new course, so the course evaluations are especially important for me to improve my teaching and improve this course for future classes.

Tentative Schedule of Topics

This is a new course, and so this list is VERY tentative.

The Modern Optics topics will be determined by you. We will take a survey at the beginning of class and cover whatever topics are most interesting to everyone.

Week	Reading	Topics
Jan 12	Chapter 2/3	What is light?
Jan 19	Chapter 3/4	Propagation of Light
Jan 26	Chapter 4/5	Geometrical Optics
Feb 2	Chapter 5 (maybe 6)	Geometrical Optics
Feb 9	Chapter 7	Superposition of Waves
Feb 16	Chapter 8	Polarization
Feb 23	Chapter 9	Interference
Feb 27	Midterm Exam	
Mar 2	Chapter 9	Interference
Mar 9	Spring Break!	
Mar 16	Chapter 9/10	Interference /Diffraction
Mar 23	Chapter 10	Diffraction
Mar 30	?	Modern Optics
Apr 6	?	Modern Optics
Apr 13	?	Modern Optics
Apr 20	?	Modern Optics
Apr 27	Review	