

## **Optics Lab 1361 Wave Motion and Optics Syllabus**

### **Instructor:**

David Snoke

G-10 Allen Hall (press buzzer—we can't hear you if you just knock)

Office hours Tues, Thurs 10 AM-noon, or by appointment: email is the best way to contact me.

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### **Teaching assistants:**

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Office Hours: 1:00-2:00 PM Thursdays

**Textbook:** Hecht, *Optics*, 4th edition (Addison Wesley).

### **Other resources:**

All students are expected to log in to [courseweb.pitt.edu](http://courseweb.pitt.edu) to get their assignments and other handouts for the lab. If you have trouble logging into this site let me know immediately.

The department has Kaleidagraph, scientific plotting and curve fitting program, on several computers available in the department. You may also want to buy a copy for your own computer—both Mac and PC versions are available. Another popular choice is Matlab, which I can't help you with but others in the department can.

### **Schedule:**

no lab (error analysis assignment): Aug 27, 29

Readings for Lab 1: Hecht 2.1-2.5, 2.7-2.9, 3.2, 4.3.1, 4.4.1, 4.7, 5.5.1

Lab 1 (Refraction): Sept 3, 5

Readings for Lab 2: Hecht 5.2-5.4

Lab 2 (Lenses I): Sept 10, 12

Readings for Lab 3: Hecht 5.7 (all subsections), 6.1

Lab 3 (Lenses II): Sept 17, 19

Readings for Lab 4: Hecht 4.6 (all subsections), 8.6

Lab 4 (Linear Polarization): Sept 24, 26

Readings for Lab 5: Hecht 8.1-8.5 (all subsections), 8.7, 8.8, 8.10  
Lab 5 (Circular Polarization): Oct 1, 3

makeup lab: Oct 8, 10  
MIDTERM Oct 10  
Writing Option paper #1 due Oct 15

Readings for Lab 6: Hecht 2.6, 9.1-9.6 (all subsections)  
Lab 6 (Interference): Oct 15, 17

Readings for Lab 7: Hecht 10.1-10.2 (all subsections)  
Lab 7 (Diffraction by Slits): Oct 22, 24

Readings for Lab 8: Hecht 10.3 (all subsections)  
Lab 8 (Fresnel Diffraction): Oct 29, 31

Readings for Nov 5-7 (Fourier optics): Hecht 11.2 (all subsections), 11.3.1, 11.3.2, 11.3.3  
Readings for Nov 12-14 (holograms): Hecht 13.2.1, 13.2.2, 13.2.3, 13.3 (all subsections)  
Special project 1: Nov 5, 7, 12, 14

Readings for Nov 19-21 (nonlinear optics): Hecht 3.5, 13.4 (all subsections)  
Readings for Dec 3-5 (quantum optics): Hecht 3.3 (all subsections), 4.11 (all subsections)  
Special project 2: Nov 19, 21, Dec 3, 5

Writing Option paper #2 due Dec 10

### **Grading policy:**

Lab assignments: 60%  
Homework: 10%  
Midterm exam: 10%  
Final exam: 20%

### **Lab Grading**

There are 8 “recipe” lab assignments, each graded 30 points, as follows:

10 points: lab notes. You **MUST** have your lab notes signed by the TA before you leave the lab to get credit for your notes. You should attach a copy of your notes, with the TA signature, to your lab report when you hand it in.

10 points: analysis. The labs give various assignments for quantitative analysis and plotting, and sometimes ask qualitative questions. The analysis grade includes proper accounting of error: points will be taken off for improper error analysis. It is not necessary to have a formal writeup, but the lab report should be intelligible and easy to follow; TA’s will deduct points if they have to search for your answers or to understand what you did.

10 points: exercises. Each lab includes several assignments that you must do, in addition to the weekly assigned homework based on the lectures.

Late policy: Lab reports are due one week after the lab. They should go directly to your TA.

TA's will deduct 2 points per weekday of lateness, up to a maximum of 10 points deducted for labs handed in a week or more late. No credit will be given for the exercise part of the lab after the solutions are handed out.

Excused absences from lab may be made up in one of two weeks (see above schedule). You should contact me if you have a valid excuse, so that I can have someone to open the lab for you and get you set up.

Special Projects: In the final four weeks you will have your choice of one of several special projects. You can work on each for two weeks (or even a 3rd week, if you want to work in Thanksgiving week or finals week.) These are more open to your own creativity, instead of just following recipes. There are no exercises. Each lab is worth 60 points based on our evaluation of your effort and writeup.

### **Writing Option**

For the writing option you should take two of your labs and write them up formally, with complete English sentences, in the format of the *American Journal of Physics*, including abstract, citations, figures with captions, equation numbering, etc. Go to the American Journal of Physics online and download a paper, and follow its format exactly! This is an English writing assignment: points will be taken off for bad grammar, spelling, style, etc., as well as for not following the proper journal format.

You may hand in a first draft of each paper one week in advance of the deadline if you would like feedback on format, etc.