

University of Maryland
Department of Physics
Spring 2006 **Prof. Luis Orozco** **Physics 375**

Title: PHYS 375 Experimental Physics III: Optics. Third course in the three-semester introductory sequence. In keeping with efforts to improve the department curriculum, this course is evolving into a hybrid Lecture/Laboratory optics course. This is the second semester of this new format, and the course will most evolve over the semester, depending on the input of the students. It will nominally consist of lectures on topics in optics at the beginning of the session followed by a related laboratory. There will be six laboratories. **This is a 3 credit course.**

Prerequisite:

PHYS 273 and PHYS 276. *Credit will be granted for only one of the following: PHYS 375 or former PHYS 296*

Instructor:

Prof. Luis Orozco, Room 2127 (Physics Building).

Phone: 5-9740

e-mail: lorozco@umd.edu

Office hours: Tuesday 1:00 to 2:00 PM or by appointment.

Schedule:

One meeting weekly: Section 201 Monday 2:00pm- 5:50pm (PHY 3104)

One meeting weekly: Section 301 Tuesday 2:00pm- 5:50pm (PHY 3104)

Required Texts:

Optics, 4th edition by E. Hecht ISBN 0-8053-8566-5

2 Lab Notebooks

Suggested Additional Reading:

Data Reduction and Error Analysis for the Physical Sciences (2nd Edition) by P. R.

Bevington and D. K. Robinson ISBN 0-07-911243-9

An Introduction to Error Analysis by J. R. Taylor. 0-935702-75-X

Overview:

PHYS375 is a three (3) credit course that meets four hours a week. In a new configuration, it will include a substantial lecture component. The primary laboratory objective consists of learning physics through experimental investigation. Topics to be covered include electromagnetic waves, geometrical optics, polarization, interference and interferometers, diffraction, and atomic spectra. There will be approximately six experiments, each lasting for two class periods, as well as lectures. This course will allow you to develop practical laboratory skills including experimental design and experimental uncertainty inherent in all measurement. You will be required to submit reports for each experiment completed, along with homework submitted on those weeks when a lab report is not due. There will be a midterm exam and a final exam.

Computers

Developing a working knowledge of computers in the context of physics problem solving is an important skill. You will accumulate data with a computer-based data acquisition system. We will provide some elementary Mathematica notebooks for use in data analysis, but you can use other software for the work.

Grading:

Your final grade will be based on 1200 points according to the following scheme:

Lab reports @ 100 pts each 600 pts

Homework 200 pts

Mid-term and final exam, (equal value) 400 pts

TOTAL 1200 pts

Phys 375 Lab Manual

Because the course is in transition, we will not be using a traditional Lab Manual. Information necessary for each lab will be posted on the course website for download.

Lab Reports:

The emphasis in the lab reports will be to learn how to keep a laboratory notebook. This should be a record of what you did in the lab (including mistakes – never erase!). The lab report should consist of two main parts – the record of what you did in the lab, including notes on the apparatus, how you acquired data, and the raw data. The second part is data analysis, including plots, extraction of the actually quantities to be measured, and uncertainty analysis. It should end with a discussion of ways to improve the measurement. This may be a different form for a lab report than you are used to – rather than having you repeat the material we already know (what the problem is, what the equipment is,...) you should focus on what you did and what conclusions you drew. The grading will be as follows

Laboratory record 50 pts

Data analysis 40 pts

Discussion of uncertainties and ways to improve 10 pts

TOTAL 100 pts

You have one week to turn in your lab report after completion of the lab. The reports will be due by at the beginning of class on the day following the completion of the laboratory. Any lab reports submitted after the deadline will suffer an automatic **50% reduction** if they are up to 1 week late, and a **100% reduction** if they are more than 1 week late.

No Exceptions!!!!

If you should miss any lab for any reason, you should contact the instructor as soon as possible to make an arrangement for makeup. **Any missing lab will result in failing the entire course.**

Lab Notebook:

You will be required to purchase two lab notebooks , so that you have one to work in while the other is graded. Purchase the quad-ruled coop-style notebooks (brown covers) but avoid those with carbon paper. The Book Exchange usually stocks these.

Homework:

You will be given a modest homework assignment every two weeks, due at class on the days when a lab report is not due. Late homework is disallowed (you get **0** points),

however you will be able to drop your lowest homework grade. The assignments will be posted on the course website.

Academic Dishonesty (cheating):

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.studenthonorcouncil.umd.edu/whatis.html>.

Academic dishonesty is a serious offense that may result in suspension or expulsion from the university. In addition to any other action taken, the normal sanction is a grade of “XF”, denoting “failure due to academic dishonesty,” and will normally be recorded on the transcript of the offending student.

Course Web Site:

The course web site is located at:

<http://www.physics.umd.edu/courses/Phys375/OrozcoSpring06/>

All of the course notebooks are located there, along with helpful notes about error analysis, keeping a lab notebook, contact information, this syllabus, etc.

Nitty Gritty:

Please do not bring any food or drink into the lab under any circumstances.

Before leaving the lab for the day, I may inspect your lab notebook and your Mathematica notebook to insure that your data is sound and valid. Please remember that the laboratory equipment is taken down each week and you have very limited opportunities to take the data again.

Tips For Doing Well In This Course:

- 1) Read the material before class.
- 2) Freely ask questions in lecture and lab. Also discuss problems with your friends and labmates.
- 3) Keep a readable and well-organized lab notebook. It is good to learn this now because you will be required to use one in PHYS 405.

How You Can Help

The changing format of this course is in response to both the need to put optics back into the Physics curriculum, and the recognition that cookbook-style labs are not pedagogically effective. Because the course is in transition, you will have the opportunity to influence its direction with your feedback and ideas throughout the semester. This can serve to improve your experience as well as for those who follow you in the future.