

Physics 375 Syllabus - Spring 2013

Professors Peter Shawhan and Fred Wellstood

Official Course Description:

PHYS 375 (*PermReq*) *Experimental Physics III: Electromagnetic Waves, Optics and Modern Physics; (3 credits)* Grade Method: REG/P-F/AUD. Prerequisite: PHYS276 and PHYS273. Third course in the three-semester introductory sequence. Methods and rationale of experimental physics. Experiments chosen from the areas of electromagnetic waves, optics and modern physics.

What the course is about:

Physics 375 is the fourth course in the regular Physics lab sequence PHYS 174-275-276-375-405. The course is intended for physics majors and also for science and engineering students who desire a more rigorous introduction to experimental science. Physics 375 is designed to give students hands-on experience with laboratory equipment and techniques related to optics and modern physics, including experimental design and error analysis. Specific topics include electromagnetic waves, geometric optics, polarization, interferometry, diffraction, and atomic spectra. Each student has his/her own apparatus with MATLAB-based control and data acquisition and decides how to plan, carry out, and interpret measurements, consulting with the instructor, TA, and the other students in the class.

This 3-credit course includes a one-hour lecture each week about the theory and applications of optics and related topics, in addition to three hours per week in the lab.

All three sections meet together on Mondays from 2:00-2:50 in room 3112 for the lectures, given by Prof. Shawhan. Lab periods are from 3:00-5:50 in room 3203 (adjacent) on Mondays, Tuesdays, or Wednesdays for sections 0101, 0201, or 0301, respectively. The lab periods are led by Prof. Shawhan on Mondays and Wednesdays and by Prof. Wellstood on Tuesdays. Most of the experiments run for two weeks. Lab reports are due after each experiment, with other homework (based mainly on the lectures and the textbook) due in alternating weeks.

Web Site: To get the latest information on Physics 375, check the web site at:

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

Lab sections:

Lab section	Day	Time	Instructors	Teaching Assistant	Lab Room
all sections	Monday	2-2:50 PM	P. Shawhan		3112 Phys
0101	Monday	3-5:50 PM	P. Shawhan	Chunxiao Liu	3203 Phys
0201	Tuesday	3-5:50 PM	F. Wellstood	Chunxiao Liu	3203 Phys
0301	Wednesday	3-5:50 PM	P. Shawhan	Chunxiao Liu	3203 Phys

Course Instructors:

Prof. Peter Shawhan

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Prof. Fred Wellstood

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* Teaching Assistant

Chunxiao Liu

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0104 Physics Bldg

* **Office Hours:** You can try stopping by our offices at any time, but if you can't find us, make an appointment by e-mail.

* **Prerequisites:** The prerequisite for the course is Physics 273 and 276.

* **Required Texts:**

The required textbook for the course is "**Introduction to Modern Optics**", second edition, by Grant R. Fowles. This is an inexpensive Dover edition (ISBN 978-0486659572), a pleasant change from most hideously expensive physics textbooks! You should be able to get it for around \$18 or less, so please do buy a copy.

You will also need a good-quality lab notebook for carefully sketching and recording experimental set-ups, notes and data. We recommend a ~9-by-12 inch bound notebook, quad ruled, with at least 75 sheets (150 pages). Don't get one with perforated pages or carbonless duplicate pages.

There is no lab manual for you to buy for this course. Descriptions of the experiments will be posted on ELMS for you to download.

Proper analysis of experimental measurements and their errors is crucial in this course. Therefore, we recommend that you get a good book covering statistics, error propagation and least-squares fitting if you don't already have one. Two good choices (that we have asked the bookstore to stock) are "**Data Reduction and Error Analysis for the Physical Sciences**", third edition, by Bevington and Robinson (McGraw-Hill Science/Engineering/Math, ISBN 978-0072472271) and "**A Practical Guide to Data Analysis for Physical Science Students**" by Lyons (Cambridge University Press, ISBN 978-0521424639). The Lyons book is cheaper and at a lower level, but Bevington is a classic and a more complete reference that can serve you well for many years. The "**Introduction to Error Analysis**" book by Taylor is also OK if you have it, but some students find it unnecessarily long and wordy.

* **Arriving late to class:** Classes at Maryland begin right on the hour. It is important that you arrive on time so that you can get instructions for the lab and have time to finish. If you arrive too late, you may not be allowed into the lab and will have to make it up during another section.

* **Making Up Missed Labs:** You should make every effort not to miss your regularly scheduled lab. If you miss your regular lab section for a valid reason (such as illness), you should make that lab up by going to another section that week (if space is available) or by scheduling a makeup lab with the TA before your next lab. In any case, contact your instructor as soon as you reasonably can.

* **Grading:** 60% Lab Reports (6 reports)
20% Homework (7 homework sets)
20% Practical Exam

No labs or homework assignments will be dropped.

Missing one Lab (and not making it up) will cost one letter grade in your final grade.

Missing one homework set will cost one-half of a letter grade in your final grade. Final grades will be computed based upon the above weightings. Standard grading will be followed (A is 90-100, B is 80-90, etc.) unless the class's distribution of scores is unusual, in which case a standard curve will be used.

* **Your Lab Report** - Each week, before you leave the lab, you must submit to ELMS Canvas a current version of your lab report that includes all the work you completed so far. Since you will be working on an experiment for two weeks at a time, you will need to make revisions and finish

writing up your report during the week. Your final report will be due once every two weeks before the start of your next lab session (see the schedule at the end of the syllabus). We encourage you to submit it well before the deadline.

* **Homework** is assigned every other week. You will turn your homework to ELMS/Canvas, so you can either do it on a computer or else do it on paper and then scan it. You can turn in your homework anytime during the week, but by no later than the beginning of the next lecture (Monday at 2:00 PM). Corrected homework should be available the following week.

* **No credit will be given for late lab reports or homework unless you are seriously ill and provide a written note from your physician.** If you are ill and unable to come to class, you should still submit your lab report or homework on ELMS on time, if possible.

* 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>.

* **General Comments on the Lab report and Homework:**

Finishing all the lab reports and homework sets is very important. If you can't completely finish a lab and homework set, it is still important to turn in what you do have on time. When you are working on your report or homework, feel free to discuss with other students to try to figure out what is going on. However, do not use these discussions as an excuse to copy someone else's report or solution, or let someone else copy yours. That is cheating and is strictly forbidden, as well as self-defeating. The right way to proceed is first to work through the report and arrive at a definite answer on your own, even if you don't think it is right. With this preparation you can then discuss intelligently with your colleagues and see if you have missed something essential. Of course, you can always ask one of your instructors.

One final thing, if you miss something fundamental in a lab or test, you may be assigned extra problems to solve until you master the concept.

* **Religious observances:**

If you need to miss class, a homework deadline, or an exam due to a religious observance, please notify your instructor in advance—preferably at the beginning of the semester—so that we can make appropriate arrangements.

* **Students with disabilities:**

Accommodations will be provided to enable students with documented disabilities to participate fully in the course. Please discuss any needs with your instructor at the beginning of the semester so that appropriate arrangements can be made.

* **In case of Bad weather:** Winter in the Washington Metro area can bring large snowstorms that make travel dangerous. If the University is closed during a scheduled lab, class will be cancelled, and we may reschedule the lab for the following week. However, you should still submit your homework or lab report on time on ELMS (unless circumstances prevent you from being able to). Closing is announced over local radio and TV as well as on the [University's homepage](#).

Important Dates for Spring 2013 (Preliminary Schedule)

Lecture date	Lab date	Assignment that needs to be turned in before the start of lecture or lab	Experiment
Jan 28	Jan 28,29,30	--	Lab 0
Feb 4	Feb 4,5,6	Homework 0	Lab 1
Feb 11	Feb 11,12,13	Homework 1	Lab 1
Feb 18	Feb 18,19,20	Lab 1 Report	Lab 2
Feb 25	Feb 25,26,27	Homework 2	Lab 2
Mar 4	Mar 4,5,6	Lab 2 Report	Lab 3
Mar 11	Mar 11,12,13	Homework 3	Lab 3
Spring break			
Mar 25	Mar 25,26,27	Lab 3 Report	Lab 4
Apr 1	Apr 1,2,3	Homework 4	Lab 4
Apr 8	Apr 8,9,10	Lab 4 Report	Lab 5
Apr 15	Apr 15,16,17	Homework 5	Lab 5
Apr 22	Apr 22,23,24	Lab 5 Report	Lab 6
Apr 29	Apr 29,30, May 1	Homework 6	Lab 6
May 6	May 6,7,8	Lab 6 Report	Practical Exam

Note: There are no labs the first week of classes (Jan 23-25) because classes start on Wednesday and it is a short week.

The Practical Exam is during the last week of regular classes and May 9 is the last day of classes. Physics 375 does not have an exam during the week of final exams (May 11-17).