

Physics 375 Syllabus - Spring 2014

Professors Peter Shawhan and Andris Skuja

*** 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 lab sequence 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 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. Skuja on Tuesdays. Note that we must ask students to clear out of the lab promptly at 5:50. Each experiment generally runs 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://www2.physics.umd.edu/~pshawhan/courses/phys375>

*** Lab sections:**

Lab section	Day	Time	Instructor	Teaching Assistant	Lab Room
all sections	Monday	2-2:50 PM	P. Shawhan		3112 Phys
0101	Monday	3-5:50 PM	P. Shawhan	Nightvid Cole	3203 Phys
0201	Tuesday	3-5:50 PM	A. Skuja	Nightvid Cole	3203 Phys
0301	Wednesday	3-5:50 PM	P. Shawhan	Nightvid Cole	3203 Phys

*** Course Instructors:**

Prof. Peter Shawhan

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Phone: 301-405-1580

Prof. Andris Skuja

e-mail: skuja@umd.edu

Offices: 4329 Physics Building
and 3013 Physical Sciences Complex

Phone: 301-405-6059

* **Teaching Assistant**

Nightvid Cole

e-mail: ncole1@umd.edu

office: 0104 Physics Building

* **Office Hours:** You can try stopping by Prof. Shawhan's or Prof. Skuja's offices at any time, but it is always best make an appointment by e-mail. Nightvid is not often in his Physics Building office, so definitely make an appointment to meet with him.

* **Prerequisites:** The prerequisites for the course are 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.

There is no lab manual for you to buy for this course. Descriptions of the experiments will be provided for you.

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 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, while Bevington is a classic and a more complete reference that can serve you well for many years – but more expensive. 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 may be able to make that lab up by going to another section that week (if space is available) or, if necessary, by scheduling a makeup lab session before your next lab. In any case, it is crucial to contact your instructor as soon as you reasonably can.

* **Grading:** 50% Lab Reports *No lab reports or homework assignments will be dropped.*
 20% Homework
 20% Practical Exam
 10% Theory Exam

Students must do ALL of the experiments and turn in lab reports for all of them. 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 curve may be applied.

*** Lab Reports**

Since you will be working on an experiment for two weeks at a time, you should write as much of your lab report as you can after the first week's lab session, and then revise and complete it after the second week's lab session. Some lab reports will be "summary" reports, while others will be "full" reports (see the posted schedule). You must submit your lab report on ELMS, and also bring a paper printout of it to turn in at the beginning of the Monday lecture, i.e. 2:00 pm (unless you are unable to print it for some reason). We encourage you to submit it well before the deadline. You can submit, revise and resubmit as many times as you want before the deadline.

* **Homework** is assigned every other week. You can either write your answers by hand on paper, or else do it on a computer and print it out. Homework papers must be turned in at the beginning of the lecture. 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://shc.umd.edu/SHC/Default.aspx> .

*** 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 report or 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 – we're here to help!

*** 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:** 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). Closings are announced over local radio and TV as well as on the [University's homepage](#).

Important Dates for Spring 2014 (Preliminary Schedule)

Lecture date	Lab date	Assignment that needs to be turned in at the beginning of lecture	Experiment
Jan 27	Jan 27,28,29	--	Lab 0: Matlab/ LabJack Intro (no report, just Word file)
Feb 3	Feb 3,4,5	Homework 0	Lab 1: Atomic Spectra (summary report)
Feb 10	Feb 10,11,12	Homework 1	
Feb 17	Feb 17,18,19	Lab 1 Report	Lab 2: Diffraction (full lab report)
Feb 24	Feb 24,25,26	Homework 2	
Mar 3	Mar 3,4,5	Lab 2 Report	Lab 3: Interference (summary report)
Mar 10	Mar 10,11,12	Homework 3	
Spring break			
Mar 24	Mar 24,25,26	Lab 3 Report	Lab 4: Polarization (summary report)
Mar 31	Mar 31, Apr 1,2	Homework 4	
Apr 7	Apr 7,8,9	Lab 4 Report	Lab 5: Refraction (full lab report)
Apr 14	Apr 14,15,16	Homework 5	
Apr 21	Apr 21,22,23	Lab 5 Report	Lab 6: Lenses (summary report)
Apr 28	Apr 28,29,30	Homework 6	
May 5	May 5,6,7	Lab 6 Report	Practical Exam
May 12	Theory Exam during lecture time – <i>No lab sessions this week</i>		

Note: Physics 375 does not have anything during the week of final exams (May 15-21).