

# Physics 174: Physics Lab Introduction Spring 2007, Profs. Ellis and Shawhan

## What the course is about

Physics 174 is an introductory Physics lab course that meets for two hours each week in Room 3115 of the Physics Building. In this course you will be expected to master a few basic ideas and tools which you will need for later labs, including: understanding experimental errors, using computer spreadsheets for analyzing, plotting and fitting data, and working with simple electrical circuits and electrical measuring equipment. This course is intended for, but not limited to, students who are interested in majoring in Physics.

**Prerequisites:** The only prerequisite or co-requisite for the course is Math 140.

**Books:** The required text is the *Physics 174 Laboratory Manual*, Ninth Edition (December 2005). We recommend that you also get a book on error analysis: either "A Practical Guide to Data Analysis for Physical Science Students" by Louis Lyons, or "An Introduction to Error Analysis" by John R. Taylor. You could also get a book about Microsoft Excel, but most students will be able to learn what they need to know about Excel just by doing the labs.

## How the course works

This course is intended to give you hands-on experience with measurement techniques and basic data analysis. You'll spend time in the lab (room 3115) each week doing an exercise that focuses on a particular concept, following pretty specific instructions in the Lab Manual. You'll answer a series of questions as you work through each exercise. Your professor and TA will be available to help when you need it and to check your work; you'll have a "checksheet" that we will initial as we check each task that you've completed. At the end of the lab period, you will turn in your work, normally in the form of an Excel spreadsheet that you will submit electronically (we'll tell you how to do that during the first meeting).

**Homework** is assigned at the end of most of the labs. Depending on how quickly you've completed the in-class exercise, you may have some time left to work on the homework before you leave. You will turn your homework electronically and you can turn it in anytime during the week, but **no later than 11:59 PM on the Tuesday before your next lab**. Grades should be available a week after you turn in each assignment.

The course includes two in-class **practical exams** which will involve making measurements and analyzing the data you collect, much like the regular exercises. (In fact, the Lab Manual lists them with exercise numbers.) The instructions and questions for these exams will be handed out at the beginning of the lab period on the scheduled exam dates.

**Course web site:** Course information, the week-by-week schedule of lab exercises, and other documents are posted in the ELMS (Blackboard) system. **You will use the course web site to turn in your Excel spreadsheets from the in-class exercises and homework**, and will also be able to use it to view your grade on each assignment. You should be able to log in at <http://elms.umd.edu>, and the course should appear in the "My Courses" panel. Prof. Ellis's sections have a separate web area from Prof. Shawhan's sections, but our current plan is to keep the same information in both areas.

## Course sections

Section	Day	Time	Instructor	Teaching Assistant
0101	Wednesday	9:00am-10:50am	Prof. Peter Shawhan	Ted Thorbeck
0301	Wednesday	1:00pm-2:50pm	Prof. Richard Ellis	Tarek Ghanem
0201	Wednesday	3:00pm-4:50pm	Prof. Peter Shawhan	Ted Thorbeck
0401	Thursday	11:00am-12:50pm	Prof. Richard Ellis	Tarek Ghanem

## Week-by-week schedule

We will skip Exercise 3 in the lab manual, but do both exercises 5 and 5\* (five-star) .

**Note the two exams on March 14/15 and May 9/10 !**

Wednesdays	Thursdays	Topic
Jan 24	Jan 25	Organizational meeting in the lab (~30 minutes long)
Jan 31	Feb 1	Exercise 1: Introduction to Excel
Feb 7	Feb 8	Exercise 2: Measurement Error and Uncertainty
Feb 14	Feb 15	Exercise 4: Straight Line Fits Using $\chi^2$ and Excel
Feb 21	Feb 22	Exercise 5: Propagation of Errors
Feb 28	Mar 1	Exercise 5*: Using $\chi^2$ to Test a Theory
Mar 7	Mar 8	Exercise 6: Review of Spreadsheets and Errors
Mar 14	Mar 15	<b>Exam on Spreadsheets and Errors</b> (Exercise 7 in lab manual)
Mar 21	Mar 22	Spring Break - no classes
Mar 28	Mar 29	Exercise 8: Resistors and Multimeters
Apr 4	Apr 5	Exercise 9: Current and Voltage
Apr 11	Apr 12	Exercise 10: The Digital Oscilloscope and the Function Generator
Apr 18	Apr 19	Exercise 11: The Oscilloscope and AC Signals
Apr 25	Apr 26	Exercise 12: Reflection of Voltage Pulses
May 2	May 3	Exercise 13: Review of Circuits
May 9	May 10	<b>Exam on Circuits and Error analysis</b> (Exercise 14 in lab manual)

## Contact information

### Prof. Richard F. Ellis

Office: 0201 Energy Research Facility

Phone: 405-7369

Email: [rfellis@umd.edu](mailto:rfellis@umd.edu)

Office hours: Thursdays 9-10:45 in my office or make an appointment by email

### Prof. Peter S. Shawhan

Office: 4205B Physics Building

Phone: 405-1580

Email: [pshawhan@umd.edu](mailto:pshawhan@umd.edu)

Office hours: Thursdays 3:00-5:00 in my office; or you can try stopping by at another time, but call or email first if you can

### Tarek Ghanem

Email: [ghanem@umd.edu](mailto:ghanem@umd.edu)

Office hours: Thursdays 9 AM - 11 AM in the lab

### Ted Thorbeck

Email: [thorbeck@umd.edu](mailto:thorbeck@umd.edu)

Office hours: Tuesdays 2:00-4:00 in room 3109 (down the hall from the lab)

You can also stop by the lab during one of the other sections if you have questions about the equipment, in-class work, or homework.

## Course policies

### Arriving late to class:

Classes at Maryland begin right on the hour. It is important that you arrive at the lab on time so that you can get instructions for the lab work and have time to finish. If you arrive more than 10 minutes late, you will probably not be allowed to do the lab at that time and will have to make it up during another section.

### Making up missed labs:

If you must miss your regular lab section (e.g. due to illness, unexpected transportation problems, or a religious observance), then you should make that lab up by going to another section that same week, if possible. Contact your instructor and the instructor of the other section (if different) to let them know that you need to do this and to check whether there is space available. If you cannot attend another section, contact your instructor ASAP and a time for a makeup lab will be arranged. In general, this should be done during the same calendar week as the lab is scheduled (so that the equipment for that lab is still set up), and **definitely no later than the following Tuesday**.

### Grading:

50%	Lab Spreadsheets
20%	Homework
15%	Test on spreadsheet, errors and measurements
15%	Test on the oscilloscope and electrical circuits

### Missed work:

Missing one lab (and not making it up before the next lab) 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. No credit will be given for late homework unless you are seriously ill and provide a written note from your physician.

### General comments on homework:

Finishing all the labs *and* homework sets is very important. Missing even one homework set will definitely hurt your grade. Do the homework early, so that you have time to ask questions if something gives you trouble! Also, if you can't completely finish a homework set, turn in what you do have *before* the deadline. When you are working on the homework sets, feel free to discuss among yourselves to try to figure out what is going on. However, do not use these discussions as an excuse to copy someone else's solution to the homework, or let someone else copy your solution. That is cheating and is strictly forbidden. It is also very self-defeating since another part of your grade will come from tests. The right way to discuss the homework is to first work through a problem on your own and try to arrive at a definite answer, even if you aren't sure it is correct. 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 - that's what we get paid for!

### Honor Code:

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> . **To demonstrate your commitment to academic integrity, please type the Honor Pledge into a cell of each Excel spreadsheet that you turn in (or write it on assignments done on paper): "I pledge on my honor that I have not given or received any unauthorized assistance on this assignment."**

### Students with disabilities:

Accommodations will be provided to enable students with 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.

### Weather and emergency closures:

If the University is closed due to weather or some emergency situation on a Tuesday when homework is due, then that homework will be due by noon on the next day when the University is open. If the University is closed on the *scheduled date of an exam*, then the exam will be given during your next regularly scheduled class period when the

University is open. If the University is closed on your regular class day in any other (non-exam) week, *including the "review" exercise week before each exam*, then the exam will still be given according to the original schedule. In these or other exceptional circumstances, we will attempt to communicate with students by email.