

Physics 174: Physics Lab Introduction, Fall 2011 Dr. Nick Cummings

What the course is about: Physics 174 is an introductory Physics Lab that meets for one hour and 50 minutes 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 working with simple electrical circuits and electrical measuring equipment, understanding experimental errors, and using computer spreadsheets for analyzing, plotting, and fitting data. This course is intended for, but not limited to, students who are interested in majoring in Physics.

Co-requisite: Math 140 (Calculus I). You will need to know how to take derivatives of functions starting about one month into the course.

Textbooks:

- *Required* : *Physics 174 Laboratory Manual*, Twelfth Edition (June 2010, ISBN 978-0-470-92024-4). It is important to get the correct edition. Be sure to bring the manual to every class.
- *Recommended* : "A Practical Guide to Data Analysis for Physical Science Students" by Louis Lyons and/or "An Introduction to Error Analysis" by J. R. Taylor.

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 instructor and TA will be available to help when you need it and to check your work; you'll have a "check sheet" 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 using ELMS (we'll tell you how to do that during the first meeting). You may not be entirely finished with your lab spreadsheet at this point, but you will have a chance to turn in a revised version with your homework.

Reading assignments are designed to help prepare you for the lab exercises, so that you can make the best use of your time in the lab. An hour and 50 minutes may seem like a lot of time, but it isn't. Preparing in advance by doing the reading assignment will help you finish on time.

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 do the homework before you leave. Homework questions will usually be answered right in the spreadsheet where you did your lab. You may also finish up (or correct) any part of the lab you didn't complete in class. You must turn in your homework (usually using ELMS) by 10:00 pm Friday. If you have an excused absence and have to make up your lab another day, the homework is due at 10:00 pm on the second day after that lab session. We will grade your spreadsheets and homework before your next lab period.

Exams: 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

Course sections:

Section	Time	Teaching Assistant
0101	9 pm – 10:50 am	Chang Lee
0102	2 pm – 3:50 pm	Jasper Drisko
0105	12 pm – 1:50 pm	Jasper Drisko

Contact Information:

Role	Instructor	TA	TA
Name	Dr. Nick Cummings	Changhun Lee	Jasper Drisko
Office	PHY 4207A		
Phone	301-405-7272		
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Office Hours: TBD

Week-by-week schedule

We will skip Exercise 3, do both exercises 5 and 5* (five-star) in the lab manual, and skip Exercise 12. Note the dates of our two exams below in bold type.

Date	Topic
9/7	Exercise 1: Introduction to Excel
9/14	Exercise 2: Measurement Error and Uncertainty
	Skip: Exercise 3: Measurements, Averages, and Standard Deviations
9/21	Exercise 4: Straight Line Fits

9/28	Exercise 5: Propagation of Errors
10/5	Exercise 5*: Using Chi Squared
10/12	Exercise 6: Review of Spreadsheets, Errors, and Chi Squared
10/19	Exercise 7 : Exam on Spreadsheets and Errors
10/26	Exercise 8: Resistors and Multimeters
11/2	Exercise 9: Current and Voltage
11/9	Exercise 10: The Digital Oscilloscope and the Function Generator
11/16	Exercise 11: The Oscilloscope and AC Signals
	Skip: Exercise 12: Reflection of Voltage Pulses
11/23	No PHYS174 labs, Thanksgiving Break
11/30	Exercise 13: Review of Circuits
12/7	Exercise 14: Exam on Circuits and Error analysis

Course Policies:

Arriving late to class: Classes at Maryland begin right on the hour. It is important that you arrive on time to the lab so that you can get instructions for the lab and have time to finish. If you arrive more than 10 minutes late, you may not be allowed to do the lab and may have to make it up during another section. This is difficult because the sections are typically full, so please don't be late.

Lab Makeup Time: If you must miss your regular lab section (due to illness, a religious observance, a University sponsored activity, or some other compelling reason), you should let your instructor know in advance (unless this is by nature impossible) and be prepared to provide documentation. You should make the missed 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 make-up 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 the lab is still set up). The homework for the lab will be due by 10:00 pm on the second day after you make up the lab. Because the other sections are typically full, it is also very hard to do a make-up, so please do not miss your lab section.

If you miss your section for medical reasons, a self-signed note will suffice for documentation if it is the first such absence. The note should state that your absence was for medical reasons (it need not state the nature of the medical issue), that the information provided is true and

correct, and that you recognize giving false information would be a violation of the student honor code.

Grading:

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

General comments on assignments: Finishing all the labs *and* homework sets is very important. Missing a lab will generally cost you one letter grade in your final grade, so be sure to come every week. Missing even one homework set will hurt your grade too, so do the best you can. 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. **No credit will be given for late homework** unless you have a valid excuse (illness, a religious observance, University sponsored activity, or some other compelling reason.) 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 self-defeating since another part of your grade will come from tests. The right way to discuss the homework is to first work through the problem on your own. Then 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.

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: www.studenthonorcouncil.umd.edu/whatis.html

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 day 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.