

**Physics 174: Physics Lab Introduction**  
**Fall 2015, Sections 0103, 0106 & 0108**  
**Dr. Wendell T. Hill, III**

**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 that 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.

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

**Required Electronic Textbook**

*Introduction to the Physics Laboratory*, Thirteenth Edition (June 2015). You must use the Thirteenth Edition because earlier editions are no longer valid and will not give you access to the online homework!

To purchase access (\$47.50) to the electronic textbook and online homework follow the link below and use the code associated with your section:

**PHYS174 Registration Link:** <https://www.theexpertta.com/registration/>

<u>Section</u>	<u>Code</u>
0103	44EBDC-16Z
0106	B21A31-16Y
0108	E725CE-15L

Please register and read Exp. 1 before the first meeting of the class. If you prefer working from a hardcopy rather than an electronic copy please print the experiment for each week and bring to class.

**Recommended Textbook**

*A Practical Guide to Data Analysis for Physical Science Students* by Louis Lyons  
**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 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. There is a checksheet in the manual for each lab. Their use will be discussed during the first lab meeting. 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. (You will be instructed on how to do this during the first lab meeting. Note, with the current version of ELMS you can upload and submit your assignment multiple times.) You have an opportunity to complete any part of the calculations for a lab at home and submit a revised version to be graded. **If you do not turn in a revised version the version submitted at the end of class will be graded; be sure to turn in a version at end of class and save it somewhere for yourself.**

**Reading assignments:** These 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 and Final Spreadsheet:** Homework is assigned at the end of most of the exercises. The homework is done electronically via the ExpertTA link. Depending on how quickly you've completed the in-class exercise, you may have some time left to do the homework before you leave. **You must complete your homework and your final spreadsheet before 11:59 pm on the Monday after your lab session.**

The course includes two in-class practical exams that 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 (Canvas) system. **You will use the course web site to turn in your Excel spreadsheets from the in-class exercises,** 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	Day	Time	Teaching Assistant	Email/Location/Phone
0103	Thurs	14:00 - 15:50	Kristi Engel	<a href="mailto:klengel@umd.edu">klengel@umd.edu</a> PSC 2238 x 56001
0106	Wed	10:00 – 11:50	Jaideep Pathak	<a href="mailto:jpathak@umd.edu">jpathak@umd.edu</a> Toll 0220 x55969
0108	Wed	16:00 - 17:50	Kristi Engel	<a href="mailto:klengel@umd.edu">klengel@umd.edu</a> PSC 2238 x 56001

## Week-by-week schedule

We will skip Exercises 5 and 13 in the lab manual. Note the dates of our two exams below in bold type.

### **P 174 - Schedule of Labs - Fall 2015**

All Sections

R. Greene and W. Hill

Week of	Topic
8/31	Exercise 1: Introduction to Excel
9/7	Exercise 2: Measurement Error and Uncertainty
9/14	Exercise 3: Measurements, Averages, and Standard Deviations
9/21	Exercise 4: Straight Line Fits Using $\chi^2$ and Excel
9/28	Exercise 6: Using $\chi^2$ and Propagation of Errors to Test a Theory
10/5	Exercise 7: Review of Spreadsheets and Errors
<b>10/12</b>	<b>Exercise 8: Exam on Spreadsheets and Errors</b>
10/19	Exercise 9: Resistors and Multimeters
10/26	Exercise 10: Current and Voltage
11/2	Exercise 11: The Digital Oscilloscope and the Function Generator
11/9	Exercise 12: The Digital Oscilloscope and AC signals
11/16	Exercise 14: Review of Circuits
<b>11/30</b>	<b>Exercise 15: Exam on Circuits and Error analysis</b>
	<b>No labs Thanksgiving Week</b>

## 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, or some other compelling reason), 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 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). 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.

## Grading:

- 40% Lab Spreadsheets
- 20% Homework
- 20% Test on spreadsheet, errors and measurements
- 20% 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 to complete all assignments. 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 assignment submit 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, 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 because 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: <http://shc.umd.edu/SHC/Default.aspx>.

**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 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. If a religious holiday falls on your lab session or exam day let me know ASAP and we will make suitable arrangements.

**Contact Information:**

Dr. Wendell T. Hill, III  
Office: 2120 IPST Bldg. (next to PSC)  
Phone: 301-405-4813  
Email: [wth@umd.edu](mailto:wth@umd.edu)