

Physics 111—General Physics I: Mechanics and Thermodynamics LAB
Section 2L, Thursday 8:00 – 10:50 a.m.
Course Description, Fall 2020

Instructor: Andrew Dougherty
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Office Hours: Please feel free to e-mail or call at any time and ask a question or set up an appointment. I will be available during my office hours and on most other days during the free times indicated on my schedule. For Fall 2020, I will be holding virtual office hours, but I will keep a channel open during those hours; you are also free to contact me at any time. We can meet over our usual Zoom class meeting link.

Classes on Snow Days and Other Emergencies: If I am unable to make it to class, I will send out an email via Moodle.

Description: This lab is designed to accompany the Phys 111 lecture class. The primary goals of this lab are to enhance your understanding of the basic physics you will be studying, and to introduce you to the *process* of doing physics. In addition, I hope to help you learn a number of general principles and ideas that apply in many laboratory situations, such as how to determine for yourself what techniques and procedures to follow to explore a particular phenomenon, how to estimate the origin, magnitude, and importance of uncertainties in your results, how to judge whether or not to believe the results, and what to do when things go wrong.

Text: There is no additional text for this course. All necessary materials will be distributed through Moodle. However, you will be required to sign up for a free account through app.Pivotinteractives.com. Instructions will be provided at the first lab meeting.

Learning Outcomes: After completing this course, you should be able to

1. Apply the basic principles from the associated lecture class to a variety of laboratory situations.
2. Generate and use data to test theoretical predictions, including making appropriate graphs, fitting simple functions to data, and incorporating basic uncertainty analysis to assess whether the data support the theory.
3. Estimate the origin, magnitude, and importance of uncertainties in your results.
4. Summarize your results in a laboratory notebook.

In addition to the outcomes listed above, this course (particularly the lab component) will promote the following outcomes from the Natural Sciences section of the Common Course of Study:

- NS 1 Employ the fundamental elements of the scientific method in the physical and natural world by identifying and evaluating a testable scientific hypothesis.
- NS 2 Create and evaluate descriptions and representations of scientific data via equations, graphs, tables, and/or models.

Attendance: You are responsible for completing all of the assigned experiments. You should have made a preliminary attempt at the lab prior to the meeting time, and you will normally complete the writeup during the lab session. However, if you need a little extra time, the final writeups will normally be due at 4:00 p.m. on the day after lab. More details will be given in the lab handout on the first day.

General Strategy:

Come to lab prepared. Students who read the lab manual *before* coming to lab are more likely to learn something from it, and much more likely to complete the lab quickly and correctly.

Ask questions. Even after you read the lab carefully, you will likely have questions. You should not expect to understand everything entirely on your own—knowing when to ask a question is also an important skill.

Don't give up easily. Most experiments are designed to work reasonably well. If your experiment is apparently not working, check with me.

Conduct of Labs: Lab should be an informal learning experience. Feel free to ask questions of me and your fellow students. Remember, however, that the purpose of the lab is to learn, so you should not simply copy what someone else does. Instead, you should make sure you understand what you need to do. Also, if you do consult anyone (besides your instructor), be sure to acknowledge that in your lab notebook.

Academic Honesty: Please consult the departmental policy on academic honesty.

Grades: Students will typically work together in teams of two. For each week, 25% will be awarded for a reasonable good-faith effort to get most of the data acquisition and analysis done prior to our individual lab meeting. The remainder will be awarded for your lab report.

Each team will submit a single report that is your joint best effort. Your grade for the laboratory will be the average of the grades for the individual labs. The basic guidelines for lab notebooks are described in the introduction to the lab manual. Here is how they specifically will apply in this section:

Grades are based on a scale of 0 to 100. A lab write-up that presents data and analysis with no major errors and barely adequate discussion will receive a grade of 80. The grade could go up or down from there. Points will be added for exemplary work and further evidence that you have fully understood what the lab was about. Points will be subtracted for mistakes, omissions, contradictions, or sloppy work. Typically, the average grade for all the labs is about 85.

Specifically, you will be rewarded for:

1. Evidence that you have identified and understood the key physical concepts involved in the experiment.
2. Quality of data taken—within the limits of the apparatus, this reflects the care with which you performed the experiment.
3. Extraordinarily good organization and clarity. Putting data **IN TABLES** often greatly enhances clarity and reduces the amount of writing you have to do.

4. Good discussion of sources of uncertainty, **especially** estimates of the size and relative importance of the uncertainties. *If you think you have made a mistake, redo the measurement or calculation.*

Note that long lists of possible errors, without any sense of whether or not those errors were actually relevant for *your* experiment, are rarely useful. *Don't make such lists.* Instead, concentrate on those few factors which you think were most important. Refer to specific data or observations you made supporting your argument.

5. Suggestions for improving the experiment, such as suggestions to clarify the physics, improve the precision, or improve the write-up.

You will lose points for:

1. Missing or contradictory data.
2. Incomplete, unclear, or incorrect analysis.
3. Illegibility. Your notes are of no use if no one else can read or understand them. In some cases, I may return the lab notebook ungraded and require you to re-write it more clearly before I will grade it.
4. Poor writing. While I don't expect a polished final product, I do expect your writing to be in reasonably clear and correct English.
5. Any clear evidence that you do not understand what you have done in the lab.

If you have any questions or complaints about grading, please ask me. I will be happy to discuss your grade and how it is determined.

Please note that most of the experiments are designed to work, and to be easily completed well within the 3-hour lab period. You should usually have plenty of time to give careful thought to what you have done and to explain your thinking clearly. You don't have to write a lot, but what you do write should be clear.

Andrew Dougherty Fall 2020 Office: Hugel Science Center 031 Lab: Hugel Science Center 025 610-330-5212 doughera@lafayette.edu					
Time	Mon.	Tues.	Wed.	Thurs.	Fri.
8:00 8:30				Phys 111 Lab	
9:00 9:30					
10:00 10:30	<i>prep</i>		<i>prep</i>		<i>prep</i>
11:00 11:30	Phys 111 HSC 100		Phys 111 HSC 100		Phys 111 HSC 100
12:00 12:30					<i>Physics Club</i>
1:00 1:30	Phys 111 HSC 100		Phys 111 HSC 100		Phys 111 HSC 100
2:00 2:30				<i>Office Hours</i>	
3:00 3:30			<i>Office Hour</i>		
4:00 4:30		Committee Meeting	<i>Physics Club</i>	Committee Meeting	

ACADEMIC HONESTY GUIDELINES

Department of Physics

It is expected that each student taking courses in the Department of Physics is familiar with the statement “Principles of Intellectual Honesty” appearing in the Lafayette College Student Handbook. The following guidelines are intended to indicate how that statement pertains to your work in physics. Your instructor may have further guidelines for your specific course. We assume that students are honest; if you are not certain as to what is expected of you, consult your instructor before proceeding.

I. EXAMINATIONS:

1. Bring only those materials specifically authorized by your instructor. Frequently in the elementary courses, you will be permitted to bring in a formula sheet or you will be provided with one.

2. If you find that the seating arrangement is such that you can see someone else’s paper, don’t look! Better yet, ask if you can sit in another seat.

3. If you use a calculator, clear the answer before setting the calculator aside.

4. If you fail to hand in your paper at the end of the period you will be awarded a grade of zero for that test.

II. TAKE-HOME EXAMINATIONS: Take-home examinations are often assigned in some courses. Specific rules governing such tests will be announced by your instructor. The overriding principle, however, is that any work submitted be your own or be specifically credited to its source. There should be no discussion of the test questions with *anyone* other than the instructor.

III. HOMEWORK: You must acknowledge *all* collaborators. You are encouraged to learn from one another. You should first try to do homework problems on your own; after all you will have to do similar problems on your own in tests. However, discussion of difficult problems with others can help you to develop your own analytical skills and is encouraged, provided that, *after discussion* you write up solutions *on your own*. Do *not* borrow or lend homework papers. There is an important difference between discussing a problem with someone and copying his or her work. There have been students who have loaned papers to friends for a few minutes to “check answers”, and been horrified to find themselves charged with academic dishonesty because their “friends” copied their solutions.

Please Note: The same ethical standards of academic integrity and honesty apply to the on-line homework as to the written homework, except that there is no place for you to specifically acknowledge collaboration. However, the same general rules apply.

IV. LABORATORY: Usually two or more students will work together in performing experiments and will submit reports of their work. In some courses, a single joint report may be submitted. Specific instructions will be announced by your instructor. If the words used to describe some part of the experiment are taken from some other source (such as the lab manual), then the source should be cited. (Reference to the lab manual can usually substitute for laborious copying.) If you consult with *anyone* about the experiment (e.g. students in your lab class other than your lab partner), that consultation should be acknowledged in your report. Do *not* borrow or lend a completed lab book or any portion of one.

V. PAPERS: Refer to the statement “Principles of Intellectual Honesty” in the Student Handbook.