Physics 151—Accelerated Physics I: Mechanics and Thermodynamics
Section 2L, Monday 4:10 – 7:00 p.m.
Lab Description, Spring 2024

Instructor:	Andrew Dougherty
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Lab:	HSC 025 610-330-5212
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Web Page:	`https://moodle.lafayette.edu/course/view.php?id=25681`

Office Hours: Please feel free to e-mail or call at any time and ask a question or set up an appointment. You are not limited to the listed times. I will also normally be available on most other days during the free times indicated on my schedule. If we are meeting virtually over Zoom, we will use the class link on our Moodle page.

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 151 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: You should purchase the *Physics 151 Laboratory Manual Spring 2024* in the bookstore.

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 report.

In addition to the outcomes listed above, this course (particularly the lab component) will promote the 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. Make-up labs are not normally available for unexcused absences. If you can not make it to your

scheduled lab, please try to come to the Tuesday afternoon section instead. Since the lab room is also used for another course, you can't count on the equipment being available outside of our scheduled lab times.

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.

Take good notes. Experiments will often re-use results from previous experiments. If you record your data and procedures clearly, you ought to find them useful as reference for subsequent experiments.

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

Academic Honesty: The fabric of science, and indeed any intellectual endeavor, is built on the integrity of all involved. Accordingly, I take academic honesty very seriously. I expect that you will abide by the "Principles of Intellectual Honesty" appearing in the Lafayette College Student Handbook.

Lab should be an informal learning experience. Feel free to seek help from me, your fellow students, other texts, friends, and even a variety of on-line sources. 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. In all cases, the principles of academic honesty apply: All nontrivial collaborators and external sources (apart from your textbook and instructor) must be acknowledged. You may seek help understanding a problem, but all work you turn in *as* your own must *be* your own original work. Copying work from another source, such as CourseHero, Chegg, Bartleby, or a generative AI source, is a violation of the Academic Honesty Policy.

Please consult the departmental policy on academic honesty.

Grades: Students will typically work together in teams of two. Each team will submit a single report that is your joint best effort. Your overall grade for the laboratory will be the average of the grades for the individual labs. The basic guidelines for lab reports 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.

Each week's lab write-up will explain what specific data and analysis are needed, but as a general rule, remember that it is *your* responsibility to explain your work. The reader should be able to easily understand what you did and what you found. Be brief but clear.

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 presentation. Your work should be easy to follow. For example: Graphs should have clear labels; data should have units; information should be presented in an order that makes sense to the reader.
5. Poor writing. While I don't expect a polished final product, I do expect your writing to be in reasonably clear and correct English.
6. 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.

Summary of Writeup Requirements

Generally, you should simply follow the instructions in the lab manual, and record whatever data or observations are appropriate as you go along. 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. Your writeups should not be long or complex, but what you do write should be clear.

Proofread your final report and consult the checklist on our Moodle page before submitting your final report.

Andrew Dougherty Spring 2024
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Time	Mon.	Tues.	Wed.	Thurs.	Fri.
9:30 10:20					
10:35 10:45					
11:00 11:25					
11:40 12:15					
12:30 12:55					
1:15 1:40 2:30		**Phys 338** HSC 017		**Phys 338** HSC 017	
2:45 3:35 4:00	**Phys 327** HSC 017		**Phys 327** HSC 017		**Phys 327** HSC 017
4:10 4:30	**Phys 151 Lab** HSC 119				
5:00 5:30		Committee Meeting	*Physics Club*		
6:00 6:30					

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.