Physics 152—Accelerated Physics II: Electricity, Magnetism, and Optics
Section 1L, Tuesday 1:15 – 4:00 p.m.
Lab Description, Fall 2024

Instructor:	Andrew Dougherty
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Web Page:	https://moodle.lafayette.edu/course/view.php?id=27801

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.

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

Description:

This lab is designed to accompany the Phys 152 lecture class. The primary goals of this lab are to enhance your understanding of the basic physics you will be studying, and to continue to introduce you to the *process* of doing physics. A number of experiments will deal with electrical circuits, since they are such an important class of applications.

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 152 Laboratory Manual Fall 2024* in the bookstore.

Learning Outcomes: After completing this lab, 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. 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. You should have received a copy with the lecture course description.

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 Fall 2024
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Time	Mon.	Tues.	Wed.	Thurs.	Fri.
9:30 10:20	**Phys 152** HSC 142		**Phys 152** HSC 142		**Phys 152** HSC 142
10:35 10:45					
11:00 11:25		**Phys 338** HSC 042			
11:40 12:15	**Phys 335** HSC 017		**Phys 335** HSC 017		**Phys 335** HSC 017
12:30 12:55					
1:15 1:40 2:30		**Phys 152 Lab** HSC 119			
2:45 3:35 4:00					
4:10 4:30					
5:00 5:30		Committee Meeting	*Physics Club*		