

Physics 104 Laboratory  
Spring 2022

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Office Hours: MW: 1:30 pm – 3:30 pm  
TTH: 1:00 – 2:00 pm  
Other Times By appointment

**Required Materials:**

Pre-lab materials are available online through Inquire. Lab instructions will be posted on Inquire and you may either print and bring a copy or bring a laptop with a digital version of the file. You may not access the lab on your phone. A bound lab notebook with sewn graph paper pages is needed, as well as a scientific calculator that is not a cellphone, and a pencil or pen.

**Goals:**

The following five goals will serve as the framework for the activities within the Lab: *the Art of Experimentation, Experimental & Analytical Skills, Conceptual Learning, Communication, and Collaborative Learning Skills*. New experimental techniques will be introduced, as well as analytical tools in dealing with errors. Hopefully the laboratory experiments will clarify and expand concepts introduced in Physics 104 lecture, while practicing report writing and your ability to clearly communicate accurate results to your colleagues and instructor.

**Intended Learning Outcomes:**

- Upon completing this course, students will be able to
- Conduct scientific experiments and obtain accurate data
  - Discuss the results of an experiment quantitatively and qualitatively
  - Identify sources of error that appear in experimental methods and
  - Communicate experimental results in a coherent, well organized, written manner.

**Attendance Policy/Make-up Labs:**

**Since 25% of your 104 grade depends on the laboratory, you must enroll in both the lecture and laboratory sections of 104, and all experiments must be completed, or your lecture final grade will be reduced a letter grade.** Furthermore, you may *only* attend the lab section for which you are registered. The lab starting and ending times are firm, although it may be possible to complete the lab before the published ending time. One missed lab may be completed during the make-up week at the end of the semester, and the report from that make-up lab is due within three days of the completed experiment.

Ten percent of your laboratory grade is determined by attendance and participation, as an average of the weekly grades, based upon a ten-point scale. It is expected that each student will attend the lab, willing to assist with all parts of the experiment and with all of the needed materials. Reductions up to five points for each of the following may be given: failure to be on time, not actively participating in data collection and analysis, forgetting your lab notebook and working calculator, *failure to complete the experiment by the allotted time*, and attention to your cell phone instead of the experiment. Weekly participation grades will be posted in the Inquire grade book.

Everyone is required to wear a face covering/mask over the mouth and nose while in all academic buildings. **If you have a temperature of 100.4 °F or higher or other coronavirus symptoms, don't come to class. Call Health Services IMMEDIATELY.** Do not come to class or go to any public area on campus. Do keep up with all readings, assignments, and deadlines. In order for your absence to be excused, you must give Health Services permission to notify me that you have consulted them about coronavirus symptoms. If Health Services informs you that you should isolate and not attend class for multiple days, inform me so that we can make a plan to keep you current in the course. All absences caused by consultation with Health Services about coronavirus symptoms or isolation ordered by Health Services will be excused, but the work must still be completed.

### **Pre-lab Assignments:**

**The purpose of the pre-lab assignment is to introduce the material that will be investigated during the lab, therefore pre-lab assignments are due at the beginning time for the lab session, and are worth 10 points.** Prelab assignments are posted on Inquire several days in advance of each experiment. The assignment is to be printed and completed, or the answers written on a sheet of paper, and then submitted at the beginning of lab. Most of the prelab assignments contain simulations, so it is suggested that access to the simulation be tested before lab is scheduled to meet. The answers to the pre-lab will be discussed at the beginning of the lab session, so it must be received before that discussion begins in order to be worth 10 points. Any pre-lab assignment submitted after the beginning time for the lab will receive 0 points.

### **Lab Notebooks:**

Each student is to purchase and bring a bound notebook with graph paper pages to lab each week. Due to the time limitations during lab, the notebook check will be brief. A well-organized notebook is easily detectable at a glance, so pay close attention to formatting procedures outlined in the lab notebook document. The goal of the lab notebook is to practice recording data and results in a well-organized and legible format.

**Each student** will have their notebook checked before leaving lab and will be graded on a 10-point scale. In order to receive the full 10 points, the notebook entries must be formatted correctly. **If a student leaves lab without having their lab notebook checked, because they either forgot their notebook or did not complete the experimental data collection and analysis in the allotted time, they may have the notebook checked the following week with a 5-point penalty.**

Each notebook check will include the following:

Neatness/Organization 1 point

Date/Title 1 point

Data Tables 3 points

Values in Columns of Organized Table

Table has title; Units and uncertainty stated in column headings

Results Tables 3 points

Intermediate Results Table has title, calculated values with column headings

Sample Calculations shown

Graphs, if applicable

Principal Results Table with title, correct headings, and uncertainty

Questions 2 points

Answered with complete sentences

### Lab Reports:

Since one of the course objectives is to communicate experimental results in a coherent, well organized, written manner, it is important to practice writing lab reports. The *Data and Results* section, as well as the *Abstract*, were written and submitted in Physics 102/103 Lab. These sections will also be written this semester, along with the introduction of the *Discussion* section. A separate document will describe the format and content of each section and will include a grading rubric.

Reports will be varied, from answering a set of questions or working problems to writing an abstract, data and results section, or discussing the experimental results. Some reports will be submitted in class as a collaborative effort, and others will be created individually outside of class and submitted through Turnitin. **All reports submitted through Turnitin via a link on the lab's Inquire page will be due at 11:59 pm on Friday of the same week.** The time stamp placed on the email by the server will determine when the work was submitted.

**Unless an extension is granted beforehand, all late items will be reduced by 10% for each 24-hour period beyond the due date/time, for school days, Monday through Friday.** As a result, after one week, assignments receive a 50% reduction and after two weeks, assignments receive a 100% reduction; that is, no assignment will be accepted if more than two weeks late. Every report submission is worth 20 points. The two lowest lab report grades will be dropped at the end of the semester.

### Academic Integrity:

Although students working within the same group will have the same data, recording of the data into the lab notebook is to be completed individually, written in table format. Excel graphs created during lab time may be shared by group members and secured in each student's lab notebook. Error values are to be calculated individually in lab notebooks, as well as sample calculations using the data. Results should be recorded in each student's notebook, and answers to questions in the experimental handout may be discussed with lab partners but are to be answered in your own words in the lab notebook.

**All individually submitted reports must be your own work, whether submitted electronically or in lab.** If the submission is a graph that was originally created during lab, it still must be recreated by you for the report, and not simply copied and pasted from the original person who graphed the results. You are not to copy from a website, textbook, or another person's report unless given permission to receive help. The college's academic integrity policies will be enforced.

### Grading:

**All grades will be recorded on Inquire.** Do not discard any graded work until the end of the semester. If there is a discrepancy between the grade recorded on Inquire and on the report, proof of the grade must be produced in order for the grade on Inquire to be changed.

At the end of the semester, your overall lab average will be sent to your lecture instructor. No curves will be applied to your lab grade. The final lab average will be determined upon the following:

<b>Attendance/Participation</b>	<b>10%</b>
<b>Completed lab notebook</b>	<b>10%</b>
<b>Pre-labs</b>	<b>10%</b>
<b>Weekly lab reports</b>	<b>70%</b>

### **Electronic Devices Usage Policy:**

Computers in the lab are networked and you are required to log onto them with your username and password. *Do not save any work to the lab computers* unless you save it to your Z: drive or onto a personal USB device; all other drives are purged when you log out. During the class, the computers in this room are to be used only for the completion of assignments directly associated with this course. **Computers, including laptops and tablets, are not to be used to check email or access the Internet for personal reasons during class.**

**Out of courtesy to others, all cell phones should be silenced or turned completely off upon arrival to class and should be out of reach. Cellphones are not to be used as calculators.** If you are engaged with your cell phone, then you are not engaged with your lab partners and the experiment, and your participation grade will be reduced. You have been warned, so no additional warning is needed. Also, MP3 players, cameras and other personal devices are not to be used during class.

### **Additional Policies:**

No food or drinks are allowed in the lab, except for screw top water bottles and closed drink containers. Since you will be wearing a mask, it will not be possible to drink or eat in the lab. If you need to take a break during lab, you may step into an isolated space to remove your mask and take a drink. Food should be consumed before coming to lab.

Students will work in groups of two or three and may select their lab partner initially. Students may have new partners during the semester, as needed. **Each member of this class is expected to treat everyone with respect, contribute to a welcoming and inclusive environment, and equally contribute to the work during lab sessions. I will gladly honor your request to address you by an alternate name or gender pronoun, if you advise me of this preference early in the semester so that I may make the change to my records.**

Accessible Education Services (AES) provides reasonable accommodations to students with documented disabilities. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Laura Leonard at your earliest convenience to schedule an appointment.

**Course Outline:**

<b>Date</b>	<b>Lab Topic</b>	<b>Report</b>
January 25	Experiment 1: Electric Field Mapping Virtual Lab	Questions/Drawings
February 1	Experiment 2: Electric Circuits	Data and Results
February 8	Experiment 3: RC Time Constant	Discussion
February 15	Experiment 4: Magnetic Field of a Current Loop	Data and Results
February 22	Experiment 5: Electromagnetic Induction	Questions
March 1	Experiment 6: Reflection and Refraction	Discussion
March 8	<b>Spring Break!</b>	
March 15	Experiment 7: Thin Lenses	Questions/Drawings
March 22	Experiment 8: Diffraction	Abstract
March 29	Experiment 9: Hydrogen Spectra	Abstract
April 5	Experiment 10: Radioactivity	Discussion
April 12	Experiment 11: TBA	TBA
April 19	Makeup Week	Required Report Due in Three Days