

Physics 102/103 Laboratory
Fall 2021

Meeting: Trexler 274
Instructor: Bonnie W. Price
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Office: Trexler 161B Office Phone: 540-375-2408
Office Hours: MTWThF: 12:00 pm – 1:00 pm
Other times by appointment

Required Materials:

Pre-lab assignments 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 (sewn pages, not spiral bound) with 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 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 102/103 grade depends on the laboratory, *you must enroll in both the lecture and laboratory sections of 102/103, and **all experiments must be completed*** or your lecture final grade will be reduced a letter grade. Ten percent of your laboratory grade is determined by attendance and participation, as an average of the weekly grades, based upon a 10-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 of five points for each of the following may be given: failure to be on time (within 5 minutes of the stated start time), not actively participating in data collection and analysis, forgetting your lab handout, notebook or working calculator, failure to complete the data collection part of the experiment in the allotted time, and attention to your cell phone instead of the experiment. Weekly participation grades will be posted in the Inquire grade book.

You may *only* attend the lab section for which you are registered, unless you have permission from the instructor prior to your regularly scheduled lab section. Special considerations for missing a lab session will be given on a case-by-case basis, due to extenuating circumstances, which could include coronavirus symptoms. In order to make up a lab missed because of a visit /consultation with Health Services, you must give Health Services permission to notify me. 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 seven days of the completed experiment.

Students will work in groups of three or four, depending upon the class enrollment, and this pairing probably will remain in place throughout the semester, so select your partners wisely.

Everyone is required to wear a face covering/mask over the mouth and nose while in all academic buildings. **Do NOT come to lab if you have a temperature of 100.4°F or higher, or other coronavirus symptoms, and call Health Services IMMEDIATELY.**

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 of the lab session. The prelab assignments are worth ten points each, and are graded on a sliding scale to encourage the student to attempt to answer every question. 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. There will be a folder on the front desk into which you will place the completed written prelab as you come into the room.

The prelab assignments may contain simulations, so it is suggested that access to the simulation be tested in time to complete the assignment. The answers to the prelab will be discussed at the beginning of the lab session, so it must be received before that discussion begins in order to be worth ten points. **No prelab assignments will be accepted after the beginning of lab, and a grade of zero will be recorded for not submitting the assignment on time.**

Lab Notebooks:

Each student is to purchase and bring a bound notebook with graph paper pages to lab each week. A well-organized notebook is easily detectable at a glance, so pay close attention to formatting procedures stated during the first session of the semester. 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 data notebook entries must be accurate, complete, legible, and formatted correctly. The only way that a student will be able to complete data collection in the allotted time is to be prepared with data tables in their notebook and familiarity with the experimental procedure before coming to class. **If a student does not bring their lab notebook, the lab may still be completed on loose-leaf paper and the report submitted, but a grade of zero will be recorded for the lab notebook grade.**

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. Most physics lab reports consist of three sections: *Abstract*, *Data and Results*, and *Discussion*. This course will emphasize the *Abstract* and *Data and Results* sections.

Most reports will be individually submitted, and a separate document will describe the format and content of the abstract and data and results sections, along with a grading rubric. A few of the reports will be submitted at the end of the lab session, while other **reports will be submitted through Inquire and will be due at 11:59 pm the Monday following a Tuesday lab.**

All individually submitted reports must be your own work. 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. The time stamp placed on the upload 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 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. Group members may share Excel graphs created during lab time in order to be 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 organized and recorded in each student's notebook. Questions are to be answered in your own words.

Submitted lab reports will be written individually, and must be each student's original work, except for shared data. The student submitting the report must recreate all graphs and tables submitted. All reports electronically submitted will come through Turnitin and not through email. 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:

| | |
|---------------------------------|------------|
| Attendance/Participation | 10% |
| Pre-labs | 10% |
| Lab notebook | 20% |
| Weekly lab reports | 60% |

Electronic Devices Usage Policy:

Computers in the lab are networked and you are required to log into 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, 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** upon arrival to class and **should be out of sight**. If you are using your cell phone during lab, or continually check it for messages, then the instructor may assign a 5 out of 10 participation grade for that lab. If you are engaged with your cell phone, then you are not engaged with your lab partner and the experiment. 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. Personal laptops may be used to view the lab instructions and create graphs in MS Excel, but the graphs must be printed for the lab notebook before the notebook is checked.

Additional Policies:

No food is allowed in lab, but drinks may be brought into the lab if in a screw top or enclosed container. Also, no tobacco products are allowed in lab. **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.**

Course Outline:

| Date | Lab Topic | Report |
|--------------|---|--|
| September 7 | Course Policies Notebook Format Data Analysis | Individual Graph |
| September 14 | Experiment 1: Kinematics in One Dimension | Group Abstract |
| September 21 | Experiment 2: Projectile Motion | Individual Abstract |
| September 28 | Experiment 3: Force and Equilibrium | Group Report |
| October 5 | Experiment 4: Conservation of Energy | Individual Abstract |
| October 12 | Experiment 5: Linear Momentum and Collisions | Individual Abstract |
| October 19 | <i>Fall Break</i> | |
| October 26 | Experiment 6: Rotational Kinematics | Group Report |
| November 2 | Experiment 7: Torque | Individual Data and Results |
| November 9 | Experiment 8: Standing Waves in Strings | Individual Data and Results |
| November 16 | Experiment 9: Buoyant Force and Archimedes' Principle | Individual Data and Results |
| November 23 | <i>Thanksgiving Break</i> | |
| November 30 | Experiment 10: Calorimetry | Group Report |
| December 7 | <i>Make-up Week</i> | Assigned Report due within 7 days of completed lab |