

Physics 102/103 Laboratory
Fall 2017

Meeting: Trexler 274
Instructor: Bonnie W. Price

Office: Trexler 161B Office Phone: 540-375-2408
Office Hours: MW: 9:30 am – 11:30 am;
T: 11:30 am – 1:00 pm
Other times by appointment

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Required Materials:

Pre-lab materials are available online through Inquire and should be printed and completed **before** coming to lab. Lab handouts will be available for use during lab and also will be posted on Inquire, if you wish to print your own copy. 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:

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. Furthermore, you may *only* attend the lab section for which you are registered, unless you have explicit permission before the earlier lab section, and switching lab sessions is allowed only once per semester. The lab starting and ending times are firm, although it may be possible to complete the lab before the published ending time. Make-up labs will only be permitted as a result of a discussion with the lab instructor *beforehand* or an emergency note (death, hospitalization, misdemeanor, etc.) *signed* by a governing official (medical doctor, parent, law enforcer, etc.).

Five percent of your laboratory grade is determined by attendance and participation, an average of the weekly grades, according to the rubric:

10 points	Comes on time for class with working scientific calculator and lab notebook Actively participates in lab procedure, data collection/analysis, and discussion Understands the purpose of the lab, working efficiently to complete the lab on time Rotates through different tasks within the group Cellphone does not appear during the lab session Does not leave the lab more than once
5 points	In attendance, but may have been tardy May have forgotten scientific calculator and/or lab notebook, or fails to use calculator May complain or waste time on other tasks unrelated to lab procedure or purpose Uses cellphone once during lab to text others or check messages, without prior permission May have left the room more than once May be unwilling to attempt different tasks, preferring to keep the same task each lab Does not complete the lab by the set ending time
0 points	Absent from lab; uses cellphone more than once during lab time without prior permission

Make-Up Labs:

A make-up lab session is scheduled for the last week of classes. If you have missed a regularly scheduled lab and, according to the previously stated attendance policy, you have discussed this absence with the instructor before missing that lab, or have an emergency note for the missed lab, then you may attend the makeup session. Only ONE lab may be scheduled for the make-up time. The original assigned report is due five days from the makeup session.

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. 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 a zero grade.

Lab Notebooks:

Each student is to purchase and bring a bound notebook with graph paper pages to lab each week. A separate document will explain the format to be used in the notebook. 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 as follows:

10 points	Notebook entries are organized and formatted according to set guidelines Data tables and Results tables are presented correctly Significant Digits are observed correctly in data and principal results tables
5 points	Entries are haphazard, illegible, not formatted according to set guidelines Data were recorded in lab notebook, but not in table format. Error or sample calculations were not shown, were incomplete, or had incorrect significant digits stated Results were not stated, or were not in table format. Graphs were not properly printed, or did not contain adequate information. Student did not originally bring lab notebook, but completed the required entry later the same week.
0 points	Student did not bring lab notebook, or left before the notebook was checked

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 Sunday or Tuesday of the following week, depending upon your lab time. Tuesday lab sections will have their reports due at 11:59 pm on the following Sunday, and Thursday lab sections will have their reports due at 11:59 pm on the following Tuesday, when submitted through Inquire.

Reports will be divided into two types: A and B. The A-type report is one that requires little individual thought. This report may involve writing a group report, submitting group data, following a tutorial for creating a particular graph or table, or writing an analysis in lab on the meaning of a data set. The A-type report may be completed in lab, or submitted through Turnitin. All group reports will be A-type reports, and will be written outside of class and then submitted by one member through Turnitin. B-type reports require more thought and analysis than A-type reports, and will count more than the value of an A-type report. Individually written abstracts or individually completed Data and Results sections are examples of B-type reports. All of these reports will be created outside of class and submitted through Turnitin.

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 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 lowest A lab report grade and the lowest B lab report grade will be dropped at the end of the semester. One B-type report

may be rewritten for a higher grade, as long as it is submitted to the instructor before the last day of classes, December 8, 2017.

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 recorded in each student's notebook.

Submitted lab sections 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	5%
Pre-labs	10%
Lab notebook	15%
Weekly lab sections	
A-type reports	25%
B-type reports	45%

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, 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 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 partners 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 as directed.

Additional Policies:

No food or drinks are allowed in the lab, except for screw top water bottles and canteens. Also, no tobacco products are allowed in lab.

Students will work in groups of two or three, depending upon the size of the lab section. Students will be rotated to different groups throughout the semester, and responsibilities within the group should rotate as well, so that each member learns how to use Excel, LoggerPro, and helps conduct the experiment.

Tentative Course Outline:

Date	Lab Topic	Report
September 5/7	Course Policies Experiment 1: Measurement and Graphical Analysis	A: Individual Principal Results Table and Graph
September 12/14	Experiment 2: Kinematics in One Dimension	A: Group Abstract
September 19/21	Experiment 3: Projectile Motion	B: Individual Abstract
September 26/28	Experiment 4: Newton's Laws	A: Individual Report
October 3/5	Experiment 5: Force and Equilibrium	B: Individual Abstract
October 10/12	Experiment 6: Rotational Kinematics	A: Individual Report
October 17/19	<i>No Lab: Fall Break</i>	
October 24/26	Experiment 7: Torque	A: Group Data and Results
Oct. 31/Nov. 2	Experiment 8: Energy and Momentum	B: Individual Data and Results
November 7/9	Experiment 9: Calorimetry	B: Individual Abstract
November 14/16	Experiment 10: Buoyant Force & Archimedes' Principle	B: Individual Data and Results
November 21/23	<i>No Lab: Thanksgiving Break</i>	
Nov. 28/30	Experiment 11: Air Column Resonance	B: Individual Data and Results
December 5/7	<i>Make-up Week</i>	Assigned Report due within 5 days of completed lab