Physics 103 Laboratory
Fall 2015

Meeting: Trexler 274 Office: Trexler 161B Office Phone: 540-375-2408
Instructor: Bonnie W. Price Office/Lab Hours: MW: 10:00 am – 12:00 noon
Email: price@roanoke.edu TTH: 12:00 – 1:00 pm and by appointment

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 103 grade depends on the laboratory, *you must enroll in both the lecture and laboratory sections of 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 from me 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 prepared for class with working scientific calculator 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, or fails to use it to calculate results May complain or waste time on other tasks unrelated to lab procedure or purpose May use their cellphone to text others or check messages during lab session 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

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. If the pre-lab is submitted at any time after the beginning of the lab session but before the end of the lab, due to computer problems opening the simulation or for other reasons including being tardy to lab, the maximum number of points possible decreases to 5 points. Any pre-lab assignment submitted after the ending time for the lab will receive 0 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. The lowest pre-lab grade will be dropped at the end of the semester.

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.

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
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, or were incomplete. Results were not stated, or were not in table format. Graphs were not properly printed, or did not contain adequate information.
0 points	Student did not bring lab notebook, or left before the notebook was checked

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.

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. Lab reports in this course consist of four sections: *Abstract, Introduction, Data and Results*, and *Discussion.* In order to have students create a well written lab report, each of these four sections will be practiced throughout the year, with this semester concentrating on *Abstract* and *Data and Results*.

Each report 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. Some 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. The only exception is the lab report for *Buoyant Force and Archimedes' Principle*, which is due on December 4, 2015 at 11:59 pm for all lab sections.

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 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. B-type reports require more thought and analysis than A-type reports. Abstracts individually written or a completed Data and Results section are examples of B-type reports. The majority 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 *Buoyant Force and Archimedes' Principle* lab requires every student to write and submit an individual report with abstract and data and results sections and that report will count 40 points, 20 points for each section. The lowest lab report section grade 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 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%**
Completed lab notebook	**10%**
Weekly lab sections	
A-type reports	**25%**
B-type reports	**50%**

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 should work in groups of three or four, and may select their group members initially. 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
September 8/10	Course Policies Experiment 1: Measurement and Graphical Analysis
September 15/17	Experiment 2: Kinematics in One Dimension
September 22/24	Experiment 3: Projectile Motion
Sept. 29/Oct. 1	Experiment 4: Newton's Laws
October 6/8	Experiment 5: Force and Equilibrium
October 13/15	Experiment 6: Rotational Kinematics
October 20/22	*No Lab: Fall Break*
October 27/29	Experiment 7: Torque
November 3/5	Experiment 8: Conservation of Momentum
November 10/12	Experiment 9: Energy and Momentum
November 17/19	Experiment 10: Buoyant Force & Archimedes' Principle
November 24/26	*No Lab: Thanksgiving Break*
December 1/3	Experiment 11: Work and Energy ***Report Due December 4, 2015 at 11:59 pm for Buoyant Force and Archimedes' Principle***
December 8/10	*Make-up Week*