

**Physics 102/103 Laboratory**  
**Fall 2020**  
**REVISED September 5, 2020**

Meeting: Trexler 274/Zoom Meeting id **709 586 6090** **Pass Code: Peanuts**

Office: Trexler 161B

Office Phone: 540-375-2408

Instructor: Bonnie W. Price

Office Hours: MW: 10:00 am – 12:00 pm +Zoom  
TTH: 12:00 pm – 1:00 pm

Email: [price@roanoke.edu](mailto:price@roanoke.edu)

Other times by Zoom or office appointment

**Required Materials:**

Pre-lab materials are available online through Inquire and should be completed **before** lab. Lab handouts will be posted on Inquire, and you are required to print and bring the handout to lab, if physically meeting in Trexler 274. 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, either in person or via Zoom, 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 (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.

**Trexler 274 Meeting:** You may *only* attend the lab section for which you are registered, due to concerns with spreading COVID-19. **If you decide to attend lab in Trexler 274, you are “opting in” and should complete a reservation on Google through the link at the top of the Inquire page, Reservation for Trexler 274.** You may decide at the last minute to attend the Zoom session instead, but deadlines for the Zoom meeting will be enforced.

Students will work in pairs if at all possible, but your lab partner cannot be identified until lab begins, since any student may decide to attend the Zoom meeting instead of coming to Trexler 274. Early polls indicate that few students will actually attend in person, so all students who wish to attend lab in Trexler 274 should come at the beginning of their lab time and plan to stay the entire three hours.

Everyone is required to wear a face covering/mask over the mouth and nose while in all academic buildings. In addition, you will be asked to wear gloves, which will be provided, while using the lab equipment and computers. Two students will be at each lab table, with the tables spaced apart as much as possible for social distancing. **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.**

**Zoom Attendance:** If the student attends lab via Zoom, each student is required to attend with audio and video enabled for the entire lab session, and the photo shown of the student is live during the scheduled time of the lab. Your Internet connection and hardware must be sufficient and in good working order for you to connect with both audio and video. Do not schedule other meetings or events during the time of the lab. **Failure to be physically present on screen for Zoom meetings during the entire time of the lab will result in being marked absent for that lab.**

If a student does not attend in person and misses a Zoom meeting, they will be marked absent and that attendance grade will remain a zero. If the student initiates via email the makeup of the missed lab within 24 hours of the stated lab start time **and** the instructor accepts the reason for the absence, a recording of the Zoom meeting will be provided to the student so that they may complete their lab notebook and stated report for that week's lab. **Original deadlines still apply for online submissions.** If the prelab assignment was submitted by the due date and time, it will be accepted if the student misses the Zoom meeting or lab meeting in Trexler 274.

#### **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 before 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.

**Meetings in Trexler 274:** 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. Students may also submit their prelab through the posted link on Inquire, but all submissions through the link must be received 30 minutes before the posted start time for the lab. If the student is unsure as to whether they will attend in person or through Zoom, they should submit the prelab through the posted link on Inquire at least 30 minutes before the scheduled lab time.

**Zoom Meeting:** If the meeting is via Zoom, the prelab assignment is **due 30 minutes before the scheduled time of the lab**, so it is due at 8:00 am for the Tuesday and Thursday morning sections and at 2:20 pm for the Tuesday afternoon section, and is to be submitted through the link posted on Inquire. It is not to be emailed to the instructor, and it may be submitted early.

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 ten points. No prelab assignments will be accepted after the beginning of lab if conducted in Trexler 274, or within 30 minutes of the start time for the Zoom meeting, 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.

**Meetings in Trexler 274:** *Each student* will have their notebook checked before leaving lab and will be graded on a 20 point scale. In order to receive the full 20 points, the notebook entries must be accurate, complete, and formatted correctly. All data tables, intermediate results tables, and principal results table must be complete, as well as sample calculations shown, graphs printed and taped into lab notebook if used, and questions at the end of the lab handout answered, if given.

**Zoom Meetings:** Each student will take photos of their completed lab notebook for the given experiment, including the table of contents page, and upload them through a posted link on Inquire, **within 48 hours of the stated ending time for the lab. If graphs are created, a separate MS Excel document is to be uploaded through the same link.** The notebook will be graded on a 20 point scale, with a 10 point penalty for the notebook not submitted within the 48 hours.

### 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 following a Tuesday lab, or 11:59 pm the Tuesday following a Thursday lab.

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 if completed outside of lab, submitted by one member through Turnitin. B-type reports require more thought and analysis than A-type reports, and will be weighted higher than the 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 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 50 points. The lowest A lab report grade and the lowest B lab report 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 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:

<b>Attendance/Participation</b>	<b>10%</b>
<b>Pre-labs</b>	<b>10%</b>
<b>Lab notebook</b>	<b>20%</b>
<b>Weekly lab sections</b>	
<b>A-type reports</b>	<b>20%</b>
<b>B-type reports</b>	<b>40%</b>

### Electronic Devices Usage Policy:

**Trexler 274:** 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 as directed.

**Zoom Meeting:** All Zoom meetings will be recorded. Chat will be visible to all students, so do not send any messages to your classmates that you do not want seen by the entire class. Please be respectful of your classmates and hopefully everyone understands that it takes the engagement of all to work through the meeting as efficiently as possible. When in "Breakout Rooms" it is expected that you are present with both audio and video, and engage with other students in the "room" as data analysis is completed.

### Additional Policies:

**Trexler 274:** No food is allowed in lab, but drinks may be brought into the lab if in a screw top container. Also, no tobacco products are allowed in lab. Each member of this class is expected to treat everyone with respect and contribute to a welcoming and inclusive environment.

**Tentative Course Outline:**

<b>Date</b>	<b>Lab Topic</b>	<b>Report</b>	<b>Meeting</b>
August 25/27	Course Policies Experiment 1: Graphical Analysis Abstract Activities	A: Group Abstract	Zoom Meeting for all students
September 1/3	Experiment 2: Kinematics in One Dimension	B: Individual Abstract	Zoom Meeting for all students
September 8/10	Experiment 3: Projectile Motion	B: Individual Abstract	Zoom Meeting for all students
September 15/17	Experiment 4: Force and Equilibrium	A: Individual Report	Zoom Meeting or in Trexler 274
September 22/24	Experiment 5: Conservation of Energy	B: Individual Abstract	Zoom Meeting or in Trexler 274
September 29/October 1	Experiment 6: Linear Momentum and Collisions	A: Group Report	Zoom Meeting or in Trexler 274
October 6/8	Experiment 7: Rotational Kinematics	A: Group Data and Results	Zoom Meeting or in Trexler 274
October 13/15	Experiment 8: Torque	B: Individual Data and Results	Zoom Meeting or in Trexler 274
October 20/22	Experiment 9: Standing Waves in Strings	B: Individual Data and Results	Zoom Meeting or in Trexler 274
October 27/29	Experiment 10: Buoyant Force and Archimedes' Principle	B: Individual Abstract B: Data and Results	Zoom Meeting or in Trexler 274
November 3/5	Experiment 11: Calorimetry	A: Individual Report	Zoom Meeting or in Trexler 274
November 10/12	<i>Make-up Week</i>	Assigned Report due within 5 days of completed lab	Zoom Recording