

Physics 201 Lab: Newtonian Mechanics Laboratory Spring 2020

Meeting: Trexler 274, TH 6:00 – 9:00 pm
Instructor: Mrs. Bonnie Price
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Office: Trexler 161B
Office Phone: 540-375-2408
Office Hours: M: 1:00 – 3:00 pm
T: 12:00 – 1:00 pm; TH: 5:00 – 6:00 pm
Other Times 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 posted on Inquire, and you are required to print and bring the handout to lab. 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:

This course will reinforce and apply the theoretical concepts introduced in Physics 201 lecture, while practicing report writing and your ability to clearly communicate accurate results to your colleagues and instructor. New experimental techniques will be introduced as you work in teams and improve your collaborative skills.

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 20% of your Physics 201 grade depends on the laboratory, *you must enroll in both the lecture and laboratory sections of 201, 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. You will be allowed one late arrival to the lab up to 15 minutes after the starting time. Any later arrival will not be allowed, unless a prior approval was granted or to accommodate an emergency. 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 five days of the completed experiment.

Five 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 attends the lab, willing to assist with all parts of the experiment, being respectful to others and their contributions, and bringing with them 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 handout, notebook or 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.

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 ten points. Prelab assignments are posted on Inquire for each of the experiments. 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 ten points. No pre-lab 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 experiment of the semester. The goal of the lab notebook is to practice recording data and results in a well-organized and legible format. You will create a Table of Contents on the first two pages of the notebook, and then each lab will start on the right-side page with the lab title, date, lab partners' names, and page number. Results should always be clearly presented in table format and sample calculations and error analysis should be presented. Pay close attention to indicating units in all column headers and for all results. Significant digits should be recorded correctly in data and in all calculations. Graphs printed in lab should be pasted in the notebook on the left-side and should be the correct size so they do not extend beyond the page edge.

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 complete and formatted clearly and correctly. If a student forgot their lab notebook or the ending time of the lab was reached without completion of all lab work and analysis, then the work graded will be worth up to ten points. If the student can complete their notebook with all necessary work by the next lab session, transferring all work by hand if the notebook was not present for the lab, the instructor will check the notebook and award the remaining ten points for the previously conducted lab.

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 four sections: *Abstract, Introduction, Data and Results, and Discussion*. You will practice writing full reports by focusing on these sections separately in some assignments, while other assignments will require the full report.

Some of the assignments will be group submissions, where one document is produced by the students at the same lab table and submitted by one of the members. Other reports will be individually written where each group member submits their own work. A separate document will describe the format and content of the report sections, along with a grading rubric. Most assignments will be due at 11:59 pm on Tuesday of the following week, unless otherwise indicated.

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.

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	15%
Lab notebook	10%
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 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 reach during class.** If you are engaged with your cell phone, then you are not engaged with your lab partners and the experiment, and the participation part of your grade will be negatively affected. 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 and tablets may be used as directed.

Disability Support:

Accessible Education Services is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. They provide reasonable accommodations to students with documented disabilities. To register for services, students must self-identify, complete the registration process, and provide current documentation of a disability along with recommendations from a qualified specialist. Please contact Laura Leonard, Assistant Director of

Academic Services for Accessible Education at 540-375-2247 or by email at aes@roanoke.edu to schedule an appointment. If you have registered with the service in the past and would like to receive academic accommodations for this semester, please contact Laura Leonard to schedule an appointment.

Class Environment:

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, three, or four, 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. 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 and group report writing.

Tentative Course Outline:

Date	Lab Topic	Report
January 16	Course Policies Experiment 1: Density	Group Data and Results
January 23	Experiment 2: Uniform One Dimensional Motion	Individual Data and Results
January 30	Experiment 3: Projectile Motion	Group Abstract
February 6	Exam 1 Review	
February 13	Experiment 4: Forces and Equilibrium	Individual Abstract
February 20	Experiment 5: Frictional Forces	Group Introduction
February 27	Experiment 6: Circular Motion	Individual Introduction
March 5	Spring Break – No Lab!	
March 12	Experiment 7: Conservation of Energy	Group Discussion
March 19	Exam 2 Review	
March 26	Experiment 8: Conservation of Momentum	Individual Discussion
April 2	Experiment 9: Angular Motion	Full Individual Report
April 9	Exam 3 Review	
April 16	Make-up Week	Report due within 5 days of completed lab