Physics 203 Laboratory
Spring 2025

Meeting: Trexler 272
Instructor: Dr. Fatima
Email: fatima@roanoke.edu

Time: THU 8:30AM–11:30AM
Office: Life Science 401B
Office Hours: MW 1:00PM – 2:00PM, Th 1:10PM – 1:40PM, & F 9:40AM-10:30AM
or by appt.

Required Prerequisites: Physics 202

Required Materials:

Materials are available online through Inquire, including lab instructions and additional readings as needed. You may print the materials needed for lab before each weekly session, or you may access them through your laptop with a digital file. You may not access the lab on your phone or on the lab computer. A bound lab notebook with sewn graph paper pages is needed, as well as a scientific calculator that is not a cellphone, and a pencil or pen. Physics 202 is a prerequisite for this course.

Goals:

Modern physics is the third and last course in the introductory undergraduate sequence. Modern physics is the physics of the 20th Century as it relates to quantum theory and relativity. This course presents experiments that were performed initially to support modern physics concepts, which includes physics of very small and/or very fast particles. In conducting these notable experiments, you will have an opportunity to practice data analysis and refine your scientific report writing skills. Hopefully, concepts presented in Physics 203 will be reinforced as they are applied in the laboratory setting.

Intended Learning Outcomes:

The successful student will:

1. explore open-ended questions that highlight course-related phenomena.
2. challenge colleagues regarding their current understanding of physical concepts as they are implemented within the lab.
3. write paragraphs that pertain to physical phenomena, graphical results, and error uncertainties in a meaningful way.
4. design experimental testing of hypotheses in part and/or in full to meet the laboratory purposes.
5. deepen their understanding and application of errors, both systematic and random, as they apply to physical results.
6. examine the historical context of scientific discovery to better understand the development of physics.

Attendance Policy:

Since 20% of your 203 grade depends on the laboratory, you must enroll in both the lecture and laboratory sections, and complete all sessions. 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 to two late entrance to the lab, up to 15 minutes after the set starting time. After the first 15 minutes, no one will be admitted without prerequisite authorization. Alternative arrangements (makeup lab) will only be entertained as a result of a discussion with me beforehand or an emergency note signed by a governing official, such as a medical doctor, parent, law enforces, etc.

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. All absences caused by consultation with Health Services about coronavirus symptoms or isolation ordered by Health Services will be excused, but the work must still be completed.

Academic Integrity:

Even though you may work with other students in lab collecting data, all graded work must be your original work. The Academic Integrity page on the RC website lists various penalties for submitting work that is not your own
https://www.roanoke.edu/inside/academic_affairs/academic_integrity/the_ai_handbook/academic_integrity_penalties
You are expected to be aware of the college's policies and may access the handbook at
https://www.roanoke.edu/inside/academic_affairs/academic_integrity/the_ai_handbook

Grading:

Unless a change is implemented, written lab reports are due one week from lab, at 11:59 pm on Monday night after the lab is completed. Your typed MS Word submissions will be electronic, through a Turnitin link provided on Inquire. Late work will receive a 10-point penalty for each 24-hour period late, not including weekends, so after two weeks the assignment has no value. Format for the lab reports will include sections that you have written in Physics 201 and 202 labs, notably an Abstract, Introduction, Data and Results, and a Discussion. A grading rubric for each section in written reports section.

Your grade in lab will be determined according to the following distribution:

Attendance and Participation	20%
Reading Material Assignments	10%
Lab Reports	70%

Accessible Education Services (AES)

Accessible Education Services (AES) provides reasonable accommodations to students with documented disabilities. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please let me know when you have completed the required forms so that we can meet to discuss possible helpful procedures.

Written Reports:

We will focus our writing efforts on specific sections of the Laboratory Report. Below I have outlined a brief description of each one, though we will examine and discuss the constituencies of each section. You will also have a rubric to follow as you construct each section.

The following items must be included on every Cover Page: title of the experiment, date, your name, and collaborators' names. Though trivial to complete, this information accurately identifies your work so that you can receive a grade.

The Abstract provides a brief summary of the entire report. This summary includes the purpose of the lab (i.e., the hypothesis), a short statement of the physical phenomena investigated, the principal numerical and/or qualitative result(s), and a concluding sentence of quantitative agreement/disagreement with the intended purpose.

An Introduction properly defines the concepts and background for the measurements and phenomena to be examined. While your Introduction does not need to be voluminous, a good introduction provides the reader enough information to ensure that you can carry out the experiment and that the reader can understand.

A neat and organized presentation of the Data and Results is important, which includes any graphs and calculations. Graphs must contain appropriate captions and labels, and equations need to be stated formally (i.e., in general form) before any values are inserted. All values need units. Any questions provided under this section in the lab handout do NOT need answering explicitly. Rather, they are meant to guide you as the lab is completed and the Discussion is written. When equations are used repetitively, they only need stating formally once, and then the results can be stated without justification (possibly just reference).

Lastly, a concise Discussion (~2 paragraphs) should conclude each lab. Here again, the results should be stated and commented on as compared with the established values (if available). Also, an attempt to summarize the possible sources of error in your measurements and/or results should be included. In this section, you could discuss any questions from the handout asked within the (Discussion and/or the Results) section

Tentative Schedule:

Date	Lab Topic
January 16	No Lab
January 23	Function Generator and Oscilloscope Basics
January 30	Oscilloscopes and Filtering
February 6	Speed of Light Using a Laser
February 13	Speed of Light Using Optical Fiber
February 20	**Exam 1**
February 27	Charge to Mass Ratio of an Electron
March 5	Spring Break!
March 12	Photoelectric Effect Using Mercury Light
March 19	Photoelectric Effect Using LEDs
March 26	Young's Double Slit Experiment
April 3	**Exam 2**
April 10	Radioactivity
April 17	Make-up

Disclaimer: Everything above is subject to change with notice and, where appropriate, your approval.