PHYS-202L-2 **Electricity & Magnetism Lab** **Fall 2022**

Class Mtgs: Th 2:50 PM - 5:50 PM
Office: Trexler 266D
Email: fatima@roanoke.edu
Office Hours & Location: T/Th 9:50AM – 11:50 AM
(Trexler 266D/via zoom by appointment)

Instructor: Dr. Fatima
Phone: 375-2057
Classroom: Trexler 273

Required Materials:

A scientific calculator and a lab notebook (a bound notebook with graph paper pages) are required. Lab instructions will be distributed in laboratory meetings and will also be posted on the class Inquire site.

Motivation:

Laboratory classes are excellent practice for building your skills at (i) working in teams on challenging projects, and (ii) expressing yourself clearly in written, and particularly scientific written, communication. These are highly desirable skills in the workplace today. Scientific writing has its own guidelines and structure; the laboratory work (and report writing) in this class is practice in this art of "mindwriting". In addition, the opportunity to reinforce and apply what is learned in the 201 courses should be welcomed by each of you. Learning physics is an iterative process, and the laboratory serves this end as it provides a grounding for the theoretical concepts learned in 202 lectures.

Intended Learning Outcomes:

The following learning activities will serve as the foundation for the lab exercises: The successful student will:

1. explore open-ended questions that highlight course-related phenomena.
2. write clearly and insightfully about physical phenomena, graphical results, and experimental error.
3. design experimental testing of hypotheses in part and/or in full to meet the laboratory purpose(s).
4. deepen their understanding of both systematic and random error, as applied to physical results.

General Attendance Policy:

Since a portion of your grade in 202 (20%) depends on the laboratory, you must enroll in both the "lecture" and laboratory sections of 202. The lab starting and ending times are firm, although it may sometimes be possible to complete the lab before the published ending time. You will be allowed one late entrance to the lab up to 15 minutes after the set starting time, i.e., <3:05. Alternative arrangements (e.g., make-ups) will only be entertained as a result of a discussion with me beforehand or an emergency note (death, hospitalization, misdemeanor, etc.) signed by a governing official (medical doctor, parent, law enforcer, etc.).

Covid-19 Illness Attendance Policy:

If you have a temperature of 100.4 or higher or other COVID symptoms, don't come to class. Call Health Services IMMEDIATELY. Do not come to class or go to any public area on campus. For your absence to be excused, you must give Health Services permission to notify me that you have consulted them about COVID symptoms. If Health Services informs you that you should isolate and not attend class for multiple days, inform me so that we can plan to keep you current in the course. All absences caused by consultation with Health Services about coronavirus symptoms or isolation ordered by Health Services

will be excused but you will need to do the work and graded assignments even if we extend a deadline for you.

Masks:
The college is starting the term without a specific mask mandate. You are encouraged to wear mask. If the policy changes, I will update the syllabus.

Academic Integrity:
We should treat our laboratory classroom hours together with mutual respect, to create a great environment for learning physics. Considering this, you must turn off cell phones, PDAs, etc. during lab. In this lab collaboration is encouraged. Collaboration relies on the individual strengths and contributions of each group member to produce a deeper level of understanding. Plagiarism exists when someone takes personal credit for another's creative (usually written) work or does not reformulate or rephrase material another individual has written. Please be advised that the RC AI policy will be upheld within this course.

Make-Up Labs:
The last week of the semester is designated for make-up labs. You will be allowed to make up at most two labs during that week, however.

Pre-lab Assignments:
The purpose of the pre-lab assignments is to introduce the material that will be investigated during the lab, therefore, pre-lab assignments are due at the beginning of the lab session and are graded out of 10 points.

Grading:
The lab grade will be composed of:
Lab reports 70%
Pre-labs 20%
Lab notebook 10%
A percentage breakdown of how the grade for each lab is determined can be found on the following page.

Lab Notebooks:
Each student is to purchase and bring a bound notebook with graph paper pages to lab each week. You may reuse your lab notebook from PHYS 201 if you have enough room in it. A Table of Contents will be created on the rest two blank pages of the notebook. The third blank page will begin the lab activities, and each new lab will begin on the right-hand page with the lab title, date of the experiment, and page number. The right-hand pages should include the recording of the data, written neatly in table format, results in table format, all sample calculations for the results and error analysis. If you decide to re-record data for some reason, you should not erase the original data written, but should instead explain the reason for re-recording, and place the new data table underneath this explanation. Units should be included in all column headers and with all results. Graphs printed while in lab should be pasted on the left-hand pages, printed so that they fit on the page when pasted into the lab notebook without extending past the edge of the page. Everyone should record answers to discussion questions in complete sentences on the right-hand pages of their lab notebook. The organization and clarity of your lab notebook at the end of the semester will determine the lab notebook component of your lab grade.

Lab Reports:

As in the PHYS 201 Lab, clear written scientific communication will be emphasized in this course. Lab reports consist of four sections: Abstract (A), Introduction (I), Data and Results (R), and Discussion (D). During the semester, written assignments will include each of these sections alone, as well as full lab reports. The content of each new section will be reviewed before that an assignment with that section is required. Some of the assignments will be group submissions (a single assignment produced by the lab group and submitted by one of the group members), and some will be individual (in which each lab member submits his or her own report). Equations must be typed using the MS Word equation editor. Lab reports will be returned within one week of submission (at the latest), except for the first lab report which will be returned by the second lab session. Please see the schedule on the last page of the syllabus for due dates of each lab; most assignments are due the Thursday following lab, with some exceptions. 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 certain number of points for each 24-hour period beyond the due date/time. All group members will receive the same grade on the group reports. The individual grading rubric for various sections and the full lab reports can be found on the next page.

Grading Rubric for Full Labs:

Section 1, Abstract: Total 15 points
Purpose (2 points)
Brief procedure (1 point)
Principal results (6 points)
Error analysis (2 points)
Validity of results/supports purpose (4 points)

Section 2, Introduction: Total 15 points
Statement of primary physics concepts in words (4 points)
Principal equations (4 points) Definition
of terms (3 points)
Written summary of data taken, and analysis performed (4 points)

Section 3, Data and Results: Total 15 points
Data Tables (1-2 points each)
Graphs (0-5 points) *
Sample Calculations (3 points)
Definition of terms with units (2 points)
*If no graphs, these points will be reassigned

Section 4, Discussion: Total 15 points
Expansion/statement of primary physics concepts (5 points)
Answers to questions (3 points)
Statement of results (1 point)
Error analysis (3 points)
Validity of results/purpose supported (3 points)

[Formatting]: Total 4 points
Descriptive Title/name(s)/date (2 points)
1.5 Spacing (1 point)
Reasonable margins and font size (1 point)

Additionally, reports will be graded for the 3 C's of Communication for a total of 36 points:
Completeness: 12 points (3 points for each section)
Conciseness: 12 points (3 points for each section)
Clarity: 12 points (3 points for each section)

This grading rubric places an emphasis on good scientific writing. Specifically, this means that: (i) ideas must be expressed fully without excessive wordiness or repetition; (ii) each topic must be stated in a clear manner that does not create confusion for the reader; (iii) the different parts of the report are clearly connected and cohesive (e.g., the discussion ties together the ideas presented in the introduction and the abstract summarizes all important elements in the experiment).

Grading Rubric for Individual Lab Sections:
Assignments of individual lab report sections (e.g., Abstract, Introduction, Discussion) will be graded on a scale of 0-100. The basic grading rubric will remain unchanged. The lab is graded first according to the presence or absence of key elements, however, because only one section is being graded, the point value for that section will increase from 15 to 60 points. Four points will still be given to formatting. The 3 C's of communication will remain a total of 36 points.

Disability Support Services:
Accessible Education Services (AES) is in the Goode-Pasfield Center for Learning and Teaching in **Fintel Library**. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Becky Harman, Assistant Director of Academic Services for Accessible Education, at 540-3752247 or by e-mail at aes@roanoke.edu to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Becky Harman at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester.

Tentative Schedule:

Week	Date	Laboratory Topic	Assignment
1	01-Sep	No lab this week	--
2	8-Sep	Simple Harmonic Motion	Abstract (Group) Due: Sept.13
3	15-Sep	Resonance	Abstract (Individual) Due: Sept. 20
4	22-Sep	Electric Field	Introduction (Group) Due: Sept. 27
5	29-Sep	Gauss's Law/ Exam 1 Review	Introduction (Individual) Due: Oct. 04
6	06-Oct	Electric potential	Discussion (Group) Due: Oct. 11
7	13-Oct	Capacitors	Discussion (Group) Due: Oct. 25
		NO LAB: FALL BREAK	
9	27-Oct.	Resistance	Discussion (Individual) Due: Nov. 01
10	03-Nov.	Exam 2 Review	
11	10-Nov.	Magnetic Field	Full lab report (Group) Due: Nov. 15
12	17-Nov.	Magnetic Field of a Current Loop	Full lab report (Individual) Due: Nov. 29
		NO LAB : THANKSGIVING BREAK	
13	01-Dec	Exam 3 Review	
15	08-Dec	Lab Makeup	Make-up labs due by Dec. 12

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