Physics 202 Electricity and Magnetism Fall 2025

Location: Trexler 273 Class Times: MWF 9:40-10:40 AM
Instructor: Dr. Fatima Office: Trexler 172A
Phone: 375-2057 Email: fatima@roanoke.edu
Student Office Hrs: Tue 10:00 AM-12:00 PM and 1:00 -2:00 PM; Wed 12:00 -1:00 PM

Course Description:
Electricity and magnetism, circuits, and some applications of classical physics.

Textbook and Required Materials:

- *Physics for Scientists and Engineers: Technology Update,* by Serway & Jewett, 9th ed, ISBN-13 978-1305116399
- Access to the online learning Platform via Cengage (WebAssign)

Purpose of the Course:
You will learn about the nature of electricity and magnetism. Together, these form the **electromagnetic force**, one of the four fundamental forces through which everything in the universe interacts (at scales larger than the atomic nucleus). These interactions take place within the framework of Newtonian mechanics, which you studied in PHYS 201. In addition, you will explore how the principles of electricity and magnetism apply to the behavior of electric circuits. The analytical and mathematical skills you develop through this process will strengthen your ability to solve problems effectively in your chosen field.

Specific Goals of the Course:
1. to understand the principles of electricity, magnetism, and basic DC and AC circuits.
2. to become familiar with several examples of modern technology based on these principles.
3. to further develop your analytical skills by solving quantitative problems in a structured way.

You will not need to memorize equations in this course. *In fact, you will be given all the equations you need on the tests*! You will learn to think carefully about the situation described in a problem, applying your knowledge of physics concepts to determine a strategy. The equations to use will follow naturally from a correct conceptual analysis of the problem.

Lecture Periods:
The concepts of electricity and magnetism are interesting, but can be challenging. This course is designed to provide multiple passes through the material, with opportunities to improve understanding with each pass.
You are expected to do relevant textbook readings *before class*. You are not expected to understand everything in the reading, but you should make an effort and try to identify areas of confusion.
Research has shown that physics students learn better when class time is spent on interactive activities designed to improve conceptual understanding, rather than on direct lecturing. So, I generally will not cover the entire reading during lecture. Instead, I will present the main concept(s), and we'll work several in-class conceptual questions/problems, during which you will both think individually and discuss with your neighbors.

Inquire (NQR):
I use the NQR environment extensively to place notes, announcements, assignments, *proofs*, *solutions*, links, and other course documents. Please do NOT forget to check NQR before you come to class or if you have a question about previous assignments.

Attendance Policy:

You are expected to attend every meeting. If you are going to be absent, I must be notified in advance. You are accountable for all work missed because of an absence. Your third and each additional absence will result in a 0.5-point reduction in your final course grade. You get two freebies so that I don't have to distinguish between excused and unexcused absences. College athletes will be afforded wiggle room; please come see me immediately if you are an athlete. If you should have an emergency that requires you to miss a large chunk of the course, please notify me ASAP.

Feedback and Evaluation:

Class grades will be calculated according to the following distribution

Tests:	30% (3 @ 10 % each)	Final Exam:	10%
Lab Grade:	20%	Participation:	10%
Homework:	20%	Quiz:	10%

Furthermore, letter grades will be assigned at the end of the semester according to the following scale

A-	90-92	A	93-100		
B-	80-82	B	83- 86	B+	87-89
C-	70-72	C	73- 76	C+	77-79
D-	60-62	D	63- 66	D+	67-69
F	<60				

Tests will be given during class on the dates indicated. *You will be given all needed equations on the test,* though the equations will not be labeled. The final exam will have the same format as the tests and will cover the selected chapters/topics.

Lab grade: Please see the lab class syllabus for information on the lab grade.

Participation will consist mainly of attentive attendance (4 pts), in-class activities (4 pts) including collective group problem-solving, listening (and responding) to lectures, engagement in question and answer, working on in-class problems, and summary of one MCSP Colloquium Talks (2 pts).

Homework assignments will be assigned every week roughly so that you can have practice applying concepts from class. Learning physics is a bit like learning another language, it's hard to improve without practicing the fundamentals. Homework assignments are due in physical format at the beginning of class.

Quizes will be given during class on the dates indicated. *You will be given all needed equations,* though the equations will not be labeled.

MSCP Conversation Series reports are completed by attending one talk in the MSCP Conversation Series and submitting a paper, which should contain: (i) a brief summary of key ideas of the talk; (ii) a description of parts of the talk that were interesting or confusing; (iii) your justified critique, including the level of presentation and the content. **The paper is due (by upload onto our course Inquire site) no later than a week after the talk**. It should be word-processed, single-spaced, approximately one page, and use proper grammar. You may not use generative AI in writing your MCSP Conversation Series Report.

Expected Hours of Work

You are expected to spend at least 12 hours per week inside and outside of class.

Make-up Tests:
Exam make-up for excused reasons (family or medical emergencies, and university-recognized commitments) must be discussed and arranged with me at least one week in advance, unless it is an emergency.

Policy on Late Work:
For homework, I will grade an assignment with a 5% lateness deduction if turned in by 5:00PM on the due date. Following that, assignments will receive a further 5% lateness deduction for each successive school day late (with days considered to end at 5:00 PM). Once the solution has been posted in Inquire, no further assignment submissions will be accepted.

Academic Integrity:
Your learning and integrity are at the core of your RC education. For this reason, you must follow the rules outline in the College's AI policies. See https://www.roanoke.edu/inside/a-z_index/academic_affairs/academic_integrity. Collaboration is an important skill that you will be asked to develop in class and in lab, and I would encourage you to extend this practice beyond the classroom as you work on problem sets. However, for the homework in particular, the final write-up should reflect your own understanding of the problem and I ask that you include the names of anyone you collaborated with when you turn in your problem set.

Use of Electronic Devices:
Electronic devices are valuable tools; therefore, my general policy is to allow the use of electronic devices in the classroom. Laptops or tablets may be used for note-taking during regular class sessions if this seems useful to you. Scientific calculators may be used during class when needed and during exams.

However, I expect your phones to be on silent mode and out of reach at all times, and I expect that any electronic devices will not be used to browse the internet or communicate with anyone inside or outside of class. A violation of this policy during an exam will be considered violation of Roanoke College's Academic Integrity policy, and I reserve the right to limit the use of electronic devices in the classroom if I feel this policy is being abused.

Accessible Education Services:
Accessible Education Services (AES) is located on the first floor of the Bank Building. 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 Dustin Persinger, Assistant Director of Academic Services for Accessible Education, at 540-375-2248 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 Dustin Persinger at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester. The testing center, also located on the first floor of the Bank Building, can be reached at 540-375-2247.

Subject Tutoring
Subject tutoring located on the lower level of Fintel Library (Room 5), is open 4-9 PM, Sunday-Thursday. Subject Tutors are highly trained, current students who offer free, one-on-one (and small group) tutorials in over 80 courses taught at Roanoke College, including: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, and Social Sciences. Check out all available subjects and schedule 30- or 60-minute appointments at www.roanoke.edu/tutoring. If you have a question, feel free to stop by, or contact us at subject_tutoring@roanoke.edu or 540-375-2590. See you soon!

Course schedule

The following schedule outlines the tentative timeline for the covered topics and exam dates:

#	Date	Topic	Reading
1	Aug. 27	Introduction and Syllabus	
2	29	Simple Harmonic Motion, Energy of SHO	15.1, 15.2, 15.3,
3	Sept. 1	Pendulum, Traveling wave, properties	15.5, 16.1,16.2,
4	3	Damped Osc, wave equation	15.6,16.6
5	5	Sound waves, Doppler effect	17.1 – 17.4
6*	8	Interference, standing waves	18.1,18.2,18.3
7	10	Resonance and air columns	18.4,18.5,18.6
8	12	Beat patterns, non-sinusoidal waves	18.7,18.8
9	15	E Charge, Coulomb's Law	23.1,23.2,23.33
10	17	Continuous charge distribution	23.5
11*	19	E field and E field lines	23.6,23.7
12	22	E flux	24.1
13	24	Gauss's Law & Applications	24.2,24.3
14	26	**TEST 1**	
15	29	Electric potential	25.1,25.2,25.3
16	Oct. 1	E Field from potential, Equipotentials	25.4
17	3	Potential of continuous distributions	25.5
18	6	Capacitance	26.1,26.2
19*	8	Capacitor network rules	26.3,26.4
20	10	Dielectrics	26.5,26.6,26.7
	13-17	**FALL BREAK**	
21	20	Electric current & resistance	27.1,27.2
22	22	Temp effects, superconductivity	27.4,27.5
23*	24	EMF, Effective resistance	28.1,28.2
24	27	Kirchoff Laws, RC Circuits	28.3,28.4
25	29	Magnetic field, force	29.1
26	31	Motion of charged particle in B field	29.2,29.3
27	Nov. 3	**TEST 2**	
28	5	B force on current-carrying wire	29.4
29	7	B torque and applications	29.5,29.6
30	10	B torque and applications	29.5,29.6
31*	12	Biot-Savart Law, Ampere's Law	30.1,30.2,30.3
32	14	Gauss's Law of Magnetism	30.4,30.5,30.6
33	17	Faraday's Law	31.1
34*	19	Motional EMF, Lenz's Law	31.2,31.3
35	21	Generators and Motors	31.5
36	24	Self-induction, LR circuits	32.1,32.2
	26- 28	**THANKSGIVING BREAK**	
37	Dec. 1	Energy in B field, LC circuits	32.3,32.4,32.5
38	3	**TEST 3**	
39	5	Review & Catchup	
		FINAL: Wed, Dec 10, 8:30-11:30am	

Note: Class numbers marked with an asterisk will begin with a 10-15-minute quiz.

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