Physics 202: Electricity & Magnetism
Fall 2018

Meeting: Trexler 272 — Time: MWF 9:40 – 10:40am
Instructor: Matthew C. Fleenor — Office: Trexler 266D
email: fleenor@roanoke.edu — Office Hours: MW 2.30–4.30pm or by appt.

webspace: faculty.roanoke.edu/fleenor/index.html

Required Textbook: *Physics for Scientists and Engineers*, 8th ed., Serway & Jewett,

ISBN13: 978-0-49582781-8

Required Prerequisites: Physics 201 and Math 122 (Calculus II)

Learning Components

Aspiration: Remember, physics is as much a means for observing the universe as well as explaining the phenomena within it. A few different levels of interpretation exist for the sentence, "I understand physics, or I understand Newtonian equations of motion" (right?). My approach will continue with a 'both/and' mentality, where both the conceptual understanding (and appreciation!) and the analytical problem-solving approach can mutually coexist. I will attempt to provide the proper atmosphere and avenues so that neither of these necessary levels of understanding need to be sacrificed. My goal for you is that you will walk away with a deeper understanding in each of these contexts.

I am excited to continue our journey as we gather tools to understand the processes of the physical world. Unlike last semester when we focused on individual objects and their motion from one point to another point, the phenomena within this semester will relate to that which is more pervasive and periodic. This is especially true with the electromagnetic field, which is both periodic and pervasive. However, before moving to the composite understanding of one electromagnetic field, we will endeavor to explain the effects of the electric field and the magnetic field separately. Underlying our entire discussion for the semester are the physical characteristics of wave phenomena and properties of periodic motion.

Expected Learning Objectives: Sucessful students will –

1. demonstrate a proficiency with the use of units and estimation;

2. display a working knowledge of the relationships involving periodic and wave motion;

3. manipulate common problems involving individual charges and conductors;

4. analyze various geometric arrangements of individual and continuous charge utilizing Gauss' law;

5. examine and decompose dc circuits for their effective resistance;

6. utilize Kirchoff's rules to solve dc circuits with multiple sources;

7. correctly predict the direction of current and forces for wires in an applied magnetic field;

8. demonstrate a proficiency in determining the net magnetic force using rules of superposition;

9. derive the exponential dependence of non-linear circuit elements from the differential equation;

10. calculate the potential difference and electrical potential energy from a static distribution of charges.

Attendance: Although roll will not be taken, daily attendance is expected. Due to the mathematically rigorous nature of the course, you may not miss more than *four* classes without a legal excuse (court, hospital, police, etc.). Late arrivals greater than 10 minutes will constitute an official absence. The fifth absence for which there is no legal excuse will constitute your (forced) withdrawal from the course.

Office Hours: Please take advantage of the office hours prescribed above, or make an appointment with me. Drop-ins are at the total mercy of my daily schedule.

Inquire (NQR**):** The information found within the NQR environment is an essential component to the course itself. Notes, announcements, assignments (and *solutions*), links, and course documents will all be placed within the course NQR. Please do NOT forget to check NQR before you come to class or if you have a question about previous assignments.

Academic Integrity: I want to foster a mutual respect for the classroom hours that we have together. Please remember to turn off cell phones, PDAs, etc. during the class and come prepared. Refer to the "Academic Integrity" page on the RC website– http://roanoke.edu/A-Z_Index/Registrar/Policies_and_Information/Academic_Integrity.htm Included here is an explanation of how violations of the College's academic integrity policy are handled.

Grades: Standard letter grades (A–F) are assigned according to the following scale for this course: "A"(91–100), "B+"(88–90), "B"(83–87), "B–"(80–82), "C+"(78–79), "C"(74–78), "C–"(70-73), "D"(60– 69), "F"(< 60).

Grading Rubric

Your grade is determined according to the following distribution:

Exams (3)	30%	Homework	20%
Final	15%	Participation	5%
Lab (202L)	20%	Quiz (weekly)	10%

Grading Components

Exams: All exams are planned (by me) for completion in 1.0 hour, however, you will have up to 1.25 hours to complete each exam. Since the class begins at 9.40 a.m., each student has the option to arrive at 9.30 a.m. and begin the exam or hold the exam until 10.50 a.m. NOTE: If you have a class that begins at 10.50, it is *your* responsibility to plan for the late arrival into your next class. All exams will contain comprehensive material from the previous chapters, most probably the one/two *most* missed problems from the previous exam/quizzes. The final exam will be given in class and will be cumulative. Make-up exams will only be allowed as a result of a discussion with me **beforehand** or a note related to the emergency (death, hospitalization, misdemeanor, etc.) *signed* by a governing official (medical doctor, parent, law enforcer, etc.).

12-Dec ***Final Exam: Cumulative, 8.30 – 11.30 am***

Quizzes: Weekly quizzes (FRIs) are completed individually or as a small group (my discretion) in class and graded. The quiz will consist of one partial problem from the class discussion, which contain the *more* important concepts and/or phenomena. Typically, the problem will not be numerical in nature.

Problem Sets: Un-/assigned problems (like those in the problem sets) are "**when and where**" you will learn the course material. For better and for worse, there is no way to learn the depth of the material within the one-hour sessions that we will have together. Due to the nature of problem solving, I expect that you will work together *toward* a solution. However, I also expect that you will create an original solution to each assigned problem. Substitutions and simplifications should **NOT** be left to the "reader" (that's me) to figure out. If necessary, words and phrases need to be properly placed so that I can follow your train of thought. Problem sets are your final draft essays and/or compositions that display the fruit of your higher-level critical thinking skills, so you need to view them in that light. These can be completed in electronic format or by-hand (neatly). If you do not follow these guidelines, I will return them to you for completion. I can provide examples of the kind of work that I expect on a final submission for the problem sets.

Labs: Physics exists because there is a connection between the mathematical world of symbols and the empirical world of measurement. Verifying the mathematical results of physical theory is an important component of the course. Creating words and sentences that express the results of experimentation is an extremely underrated (yet important) component of carrying out the enterprise of science. To think that you can carry out significant experimentation without adequate writing skills is foolish.

Participation: What it means to "participate" in Physics 201 should include the following: on-line quiz completion, listening (and responding) to audio-video lectures, attentive attendance, engagement in question and answer, working on in-class problems, reflective write-up for two extracurricular lecture or presentations, and responsibility for your own learning (office hours, etc.).

Course Outline

Please see the Outline on the following page for the exact dates of meeting for the course. The Outline also shows the daily activity and course content for our educational experience. If you have questions about scheduling, please refer to this Outline first.