

Physics 525: Electromagnetics II

Fall 2024

General Information

Course Time and Place: Tues./Thurs. 2:00-3:20PM in PB204
 Instructor: Professor Jen Schwarz
 Instructor's Office: PB207
 Instructor's Phone: 607-342-0876
 Course Slackpage: See Professor Jen for invite
 Course Webpage: www.jmschwarztheorygroup.org/phy525/
 Office Hours: TBD and by appointment

Course Objectives

What is typically one of the first things you do now even before you get out of bed in the morning? You search for your phone in the mess of sheets and check your social media accounts for anything posted since you went to sleep and perhaps check your inbox, the news, and the weather. (It used to be that you would have first to get out of bed to stumble over to your computer to check for new messages in your inbox, the latest news, and possibly even the weather.) Your phone, your computer, as well as many other devices you own, is powered by *electricity*, which is the first topic we are going to cover in this course. Electricity is a consequence of the fact that all ordinary matter contains electric charges.

Meanwhile, the next thing on your morning to-do list is to turn on a light, which, again, is powered by electricity, and allows you to wander over to the refrigerator in a darkened room with drawn shades. *Light* is another phenomenon that will be covered in this course.

Finally, as you open the refrigerator door you notice a new tear in your picture of Maxwell hanging, by, yes, a magnet. Darn. You will have to get a new picture because Maxwell is one of your heroes. You even named one of your children, in part, after Maxwell. *Magnetism* is the third topic that will be covered in this course.

Ok. So, electricity, light, and magnetism are very much part of your everyday experience, just as gravity is. One may think they are indeed three separate phenomena. To the contrary, it took physicists—physicists trying to uncover general principles of how matter and energy behave—to realize that all three phenomena can be unified under one concept dubbed *electromagnetism*. This unification sheds light (no pun intended) on how to potentially unify the other forces—gravitational, weak, and strong—into a theory of everything. In addition, electromagnetism has many practical consequences as discussed above, making it both elegant *and* useful.

To hone your knowledge of electromagnetism that you have already acquired in PHY216 and in PHY524, we will use the 5th Edition of Griffiths' *Introduction to Electromagnetism* as a guide. We will begin by reviewing the first half of Griffiths so that we are all on the same page and then launch into the second half of it. By the end of this course, you will

- (1) improve your current understanding of the laws of electromagnetism
- (2) improve your understanding about how to apply these laws to physical situations.

Textbooks

There is one **required** textbook for the course. It is titled: *Introduction to Electromagnetism, 5th Edition* by Griffiths of Reed College. If you have already purchased the 4th Edition, I will make sure to point out any differences so that you do not need to now purchase the more recent edition.

Class Meets

Class meets will consist of discussing the relevant concepts, working through sample problems with writing implements and with computer, and making a few movies (yes, making movies). *Attending these class meets should greatly enhance your chances of success in this course so, by all means, attend, not to mention there is a class meet participation grade.*

Homework

Homework assignments will be due on essentially a weekly basis. The problems will mainly consist of the end-of-the-chapter problems from Griffiths as well as a movie from time-to-time with materials that are lying around your room (or if not, then I will obtain it for you). The assignments will be posted on the course webpage and the due date will be posted on the assignment. The homework will be checked for completeness and selected parts will be graded in detail by me. The movies will also be graded by me. At the end of the semester your lowest two homework scores will be dropped. In all cases, late homework will not be accepted, particularly since solutions will be posted on the course webpage after right the homework is handed in.

Quizzams and Final Exam

There will be three timed, in-class quizzams during the semester. Each quizzam will focus on the material discussed three or four weeks prior to the week of the exam. However, given the structure of physics, earlier material may also be involved. The quizzams will be open book and open note. There will be a final exam at the end of the course and will also be open book and open note.

Assessment

Class meet participation: 15 percent

Quizzams 1-3: 35 percent

Final exam: 30 percent

Homework: 20 percent

Equality and Inclusiveness

Everyone in this class is an equally-valued member of this university and our community. I expect you to treat your classmates as honored colleagues in the collective endeavor we are all involved in: to understand the world, both natural and constructed by us (though other species also construct things) and use that understanding to improve our society.

In particular, bias against or denigration of anyone in our class because of their gender or how they express it, their sexual orientation, their religion, their national origin, their race or ethnicity, or a disability they may have will not be tolerated. If you are the target of this sort of bias or if you witness it, please report it directly to me and I will take swift action. If you don't feel comfortable talking to me, you may report it anonymously to the Physics Department at:

[https://docs.google.com/forms/d/e/](https://docs.google.com/forms/d/e/1FAIpQLScNduLL1hc9fJu5MRaKjajJFnlTDiDio0xvqprn9kCXDpS2Cg/viewform)

[1FAIpQLScNduLL1hc9fJu5MRaKjajJFnlTDiDio0xvqprn9kCXDpS2Cg/viewform](https://docs.google.com/forms/d/e/1FAIpQLScNduLL1hc9fJu5MRaKjajJFnlTDiDio0xvqprn9kCXDpS2Cg/viewform).

Moreover, at the university level, The Code of Ethical Conduct is a statement of principles guiding the activities of all faculty, staff, and students. It provides, in part, that we: Respect the rights and dignity of all persons and recognize that discrimination or harassment in any form undermines the fundamental principles of the University; and Support a respectful environment through our own actions, encourage respectful behavior in others, and speak out against hatred and bias. Additional information can be found at www.syr.edu/hcd/equal-opportunity.html. If you have any concerns about these matters, write to the Office of Equal Opportunity, Inclusion and Resolution Services at titleix@syr.edu.

University Attendance Policy

Attendance in classes is expected in all courses at Syracuse University. Students are expected to arrive on campus in time to attend the first meeting of all classes for which they are registered. Students who do not attend classes starting with the first scheduled meeting may be academically withdrawn as not making progress toward degree by failure to attend. Instructors set course-specific policies for absences from scheduled class meetings in their syllabi.

It is a federal requirement that students who do not attend or cease to attend a class to be reported at the time of determination by the faculty. Faculty should use "ESPR" and "MSPR" in Orange Success to alert the Office of the Registrar and the Office of Financial Aid. A grade of NA is posted to any student for whom the Never Attended flag is raised in Orange SUccess. More information regarding Orange SUccess can be found here, at <http://orangesuccess.syr.edu/getting-started-2/>.

I. ACADEMIC INTEGRITY AND ARTIFICIAL INTELLIGENCE (AI)

As a pre-eminent and inclusive student-focused research institution, Syracuse University considers academic integrity at the forefront of learning, serving as a core value and guiding pillar of education. Syracuse University's Academic Integrity Policy provides students with the necessary guidelines to complete academic work with integrity throughout their studies. Students are required to uphold both course-specific and university-wide academic integrity expectations such as crediting your sources, doing your own work, communicating honestly, and supporting academic integrity. The full Syracuse University Academic Integrity Policy can be found by visiting class.syr.edu, selecting, "Academic Integrity," and "Expectations and Policy."

Upholding Academic Integrity includes the protection of faculty's intellectual property. Students should not upload, distribute, or share instructors' course materials, including presentations, assignments, exams, or other evaluative materials without permission. Using websites that charge fees or require uploading of course material (e.g., Chegg, Course Hero) to obtain exam solutions or assignments completed by others, which are then presented as your own violates academic integrity expectations in this course and may be classified as a Level 3 violation. All academic integrity expectations that apply to in-person assignments, quizzes, and exams also apply online. Students

found in violation of the policy are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered. Students may not drop or withdraw from courses in which they face a suspected violation. Any established violation in this course may result in course failure regardless of violation level.

All generative-AI tools are prohibited in this course because their use inhibits achievement of the course learning objectives. This policy applies to all stages of project and writing processes including researching, brainstorming, outlining, organizing, and polishing. Do not use Generative-AI tools to create any content (i.e., images and video, audio, text, code, etc.). If you have any questions about a feature and whether it is considered Generative-AI, ask your instructor.

Academic Accommodations for Students with Disabilities

Students who are in need of disability-related academic accommodations must register with the Office of Disability Services (ODS), 804 University Avenue, Room 309, 315-443-4498. Students with authorized disability-related accommodations should provide a current Accommodation Authorization Letter from ODS to me (Professor Jen) and we will review those accommodations together. Accommodations, such as exam administration, *are not provided retroactively*; therefore, planning for accommodations as early as possible is necessary. Please go to <http://disabilityservices.syr.edu> for further information.

Religious Observance Policy

SU's religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class.

Once I am notified of each student's religious observances for the semester, I will discuss with each of you individually revised due dates for assignments, etc.

Public Health

While we have discussed the nuts and bolts of the course, my highest priority this semester is the preservation of your health (and mine). So, if you are not feeling well, one of the most important things you can do is to stay home. Many of the components of our class can be done remotely, and if you are feeling unwell – particularly if your symptoms involve nausea, cough, fever, or others common in COVID-19 or other viruses – you should reach out to me so that I can make accommodations. We often have a culture of trying to “push through” when we are not feeling well, saying things like “Yeah, I am sick, but I will be okay – I can still go to class”. While this sort of perseverance in general is a good thing, coming to class when you're sick puts other people's health at risk. So, if you have any symptoms at all, stay home. Moreover, the Center for Disability Resources also helps students with short-term injuries and illnesses – concussions, broken bones, etc. If you are sick or

hurt, I will work with you and with CDR to do whatever I can to accommodate your condition. Additionally, if you miss a large amount of class (two weeks or more), you may be eligible to take an “incomplete grade” in the course. This is a “grade pending” status that means that you were not able to finish all your work during the semester. Once you finish up your work in the summer, I can go back and give you your final grade. If you think you might need to use this option, it is important to talk to me as early as possible so we can discuss arrangements. In general, only students who have completed a meaningful amount of classwork with a passing grade are eligible to take an incomplete.