

## Objectives and Policies

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**This course will be administered through its web site:**

**<http://info.phys.unm.edu/~caves/courses/phys406-f08/info.html>.**

All the documents mentioned herein, including the course syllabus and this document, can be found at the web site. There are links to the course web site on the P&A web site and on my home page (<http://info.phys.unm.edu/~caves>). The course syllabus provides a complete schedule for the course and is your gateway to course materials, including lecture notes, special handouts, homework assignments, challenge problems, and solution sets, all of which will be available as pdf files linked to the course syllabus.

This is the second semester of a two-semester, upper-division course on electricity and magnetism. The second semester of the course has three major objectives:

- To develop familiarity with the concepts and facility with the methods of electrodynamics. The topics to be covered are the following: the Maxwell equations for time-dependent fields, propagation of electromagnetic waves, generation of electromagnetic waves by charges and currents, and the relativity of electromagnetic fields. These topics are covered in the last six chapters of the textbook. The difference between the two semesters is that the first semester dealt with *static* fields, whereas the second semester deals with *time-dependent* fields.
- To develop your nascent skills as a physicist—in particular, to develop your skill in using the physics approach to formulating and solving problems. *Most important in this regard is making the transition from freshman-sophomore ways of learning, based on learning recipes and regurgitating memorized solutions, to a more mature way of learning, based on mastering concepts and techniques so that they can be applied in situations not encountered previously.*
- To develop self-discipline and work habits that are useful both in academic course work and in the real world.

These objectives are important: they're the reason I'm giving the course and the reason you're taking it. Following now is a list of ruminations, policies, and practices, with all of which you should become familiar. Most of the items are somehow connected with the three objectives.

1. *Why bother learning about electricity and magnetism.* There are three main answers to this question.

1. *Cultural.* The theory of electricity and magnetism is an essential part of the culture of physics; you develop taste in physics by studying it.
2. *Conceptual and foundational.* Classical electromagnetism is the first field theory you encounter in physics. Almost all of physics is formulated in terms of classical fields, or the even more horrendously complicated quantum fields, or generalizations of fields like strings. The field-theoretic concepts you learn

in this course are the foundation for further learning in physics. Indeed, the rest of physics is (relatively) easy once you've mastered electromagnetic theory. The flip side of that statement is that this course is hard. It is likely to be the most difficult course you take as an undergraduate. Don't despair, though. Take heart from the century's worth of physicists and engineers who have mastered it.

3. *Pragmatic.* Electromagnetic fields are the stuff of existence on earth. Almost everything that happens on earth involves the interaction of electromagnetic fields with matter. To understand almost anything that happens on earth—in particular, to understand and to design modern technology at the fundamental level—you must understand the electromagnetic field.

In short, we study electromagnetic theory because it is a part of our culture—like 19th century English literature is part of literature—but more importantly because it is essential to any working physicist and because it gives us power over the world we live in.

2. *Prerequisites.* Your physics background should include Phys 405 (Electricity and Magnetism I) and both semesters of Analytical Mechanics (Phys 303 and 304). Your math background should include vector algebra and vector calculus at the level of Math 311 (Vector Analysis) and ordinary differential equations at the level of Math 316 (Applied Ordinary Differential Equations), and you should have taken or be taking concurrently Math 312 (Partial Differential Equations for Engineering).

3. *Textbook.* We will be using the 3rd Edition of David J. Griffiths's *Introduction to Electrodynamics*.

4. *Lectures.* It is impossible and unnecessary to cover in the lectures everything that's in the textbook. The purpose of the lectures is to cover major concepts and techniques in an environment where you can ask questions. *Please ask them! There is no such thing as a dumb question. Any question you need to have answered is a good question and is more important than getting through some prescribed set of lecture material.* The value of the lectures is enhanced by your having given the material a first reading *before* the lecture. The topic of each lecture and the relevant reading material are listed on the course syllabus.

5. *Homework assignments.* To learn physics requires doing problems, both to gain familiarity with the material and to master problem-solving techniques. The fifteen homework assignments are aimed at providing a representative sample of problems. The homework assignments will count 40% toward your grade.

Consult the syllabus for the schedule of homework assignments. Homework assignments will be posted to the web site on the date listed on the syllabus (or sooner if available) and will be due *at the lecture* on the date given on the assignment (and also on the syllabus). *Late homework assignments will not be accepted unless a prior arrangement has been made with the TA.* Assignments should be turned in at the lecture or to the TA's mailbox. *Do not turn in assignments to my mailbox.*

One of the most effective ways to learn is to work with peers. You are encouraged to consult other students about homework problems and to work in groups, but the *final product you hand in must be prepared solely by you.*

The syllabus is linked to a document that spells out standards for preparing homework assignments. You should be familiar with these standards and prepare your assignments accordingly.

Your involvement with a homework assignment does not end when you hand in the assignment or even when the graded assignment is returned to you. You should examine your work critically with an eye to making sure you *really* understand the problem and its solution. Solution sets for each homework assignment will be posted to the web site shortly after the assignment is due. The best way to improve your understanding of a problem is to consult the solution set, which represents many hours of faculty time in writing a solution that helps you to improve your understanding. Even on problems that you did successfully, it is advisable to consult the solution set because it might present a more thorough solution or alternative approaches that you haven't considered. If you still have questions about a homework assignment after carefully going over the solution set, you should see me or the TA with your questions.

6. *Problem sessions.* This course has an associated, mandatory two-hour problem session—Phys 451.057, *Problems for Phys 406*—which meets on Wednesday evenings at 7:00 pm in P&A 184. The problem session will be conducted by me and the TA.

On each homework set, a “challenge problem” will be held in reserve and assigned at the problem session. You will be divided into groups of three or four to work on the problem, while the TA and I circulate among the groups to see what you're up to. This allows us to help you directly with the material—to see how you think and to help you correct misconceptions before they get you into serious trouble. *I consider this to be the most valuable contact time in the course. It is essential that you participate.*

7. *Quizzes.* There will be six *take-home, open-book* quizzes, each counting 10% toward your grade. The schedule for these quizzes and the lectures they cover are listed on the syllabus. Each quiz will be posted to the web site on Tuesday or Thursday by 8:00 am and will be due at the lecture on the following day. You should turn in quizzes at the lecture or to the TA's mailbox.

*You must take the quizzes during the scheduled time, so set these times aside now.* If you fail to take a quiz at the scheduled time, you will receive a grade of zero, unless you have a valid reason for not taking the quiz *and* you have discussed your reason with me *before* the quiz.

Each quiz will have one or two problems, covering material from the preceding two to three weeks of lectures. The quiz will be given as soon as the material is completed and relevant homework assignments are turned in, so that the material is fresh in your mind. My goal is to design quizzes that could be completed in 80 minutes of class time by a well-prepared student. The problems will be less ambitious than the homework problems. Because the quiz problems are meant to be relatively straightforward, there will not be a liberal assignment of partial credit.

The quizzes are *take-home* and *open-book*. You may use the textbook, your own notes, your own homework assignments, all class handouts, including solution sets for homework assignments, and a pocket calculator, but do not consult books other than our textbook or

other material (including other online material). You may use as much time as you want to complete the quiz, as long as it is turned in by the deadline.

I am giving many take-home quizzes, instead of a few in-class exams, for several reasons:

1. I get more timely feedback on how you are doing.
2. Each quiz covers a clearly defined block of recently covered material. This makes it easier for you to study for a quiz and easier for me to make up a problem that represents fairly the relevant material.
3. Each quiz makes a relatively small contribution to your total grade, thereby reducing the pressure on you.
4. I want to see your best effort, without a time constraint getting in the way. You should have plenty of time to do these quizzes; time pressure should not be an excuse.

*8. Grading.* The course will be graded on a curve, with the homework counting 40% and each of the six quizzes counting 10%.

*9. Solution sets.* Solution sets for homework assignments and quizzes will be posted to the web site shortly after the assignment or quiz is due. Thereafter, if you do not find a posted solution, please contact me to remind me to post it.

*10. Getting help from the instructor and TA.* You are my first priority, and you are encouraged to get personal help from me at any time. During my office hours, which are 11:00 am–1:00 pm on Mondays and Wednesdays, I guarantee to be available in my office (or in Room 30a, next to my office, if enough of you come to see me). Outside of office hours, I will talk to you unless I have some other, overriding obligation, in which case I will schedule an appointment with you at the earliest convenient time. I am in the building every Monday, Wednesday, and Friday and in the afternoons of many Tuesdays and Thursdays. You can also get help from the TA, who is in the department every day. The TA's office hours are xxx.

*11. Additional resources.* If you are having trouble, you can get additional, personal help at CAPS. If you intend to use the resources at CAPS, please let me know, so I can direct you to a physics tutor who has experience with the material in this course.

*12. Punctuality.* Lectures and other class meetings will start precisely on time.

*13. Academic integrity is important for everyone.* All students at UNM have an inherent responsibility to uphold University principles of academic integrity and to support each other and the faculty in maintaining a classroom atmosphere that is conducive to orderly and honest conduct. You should be familiar with the following policy laid out in the *UNM Pathfinder* (available at <http://www.unm.edu/~sac/>):

**POLICY ON ACADEMIC DISHONESTY.** Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged

to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course. Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

You should also be familiar with Article 3 (Academic Dishonesty) of the Student Grievance Procedure.