

PHYS 685: Classical Electrodynamics I

Lectures

Place: Robinson B111

Time: Wednesday 4:30 – 7:10 pm

Lecture notes on the web at www.physics.gmu.edu/~joe/PHYS685.html

Instructor

Joe Weingartner (call me Joe)

Science and Technology I, room 317

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Office hours: Wednesday 2:00–4:00, or by appointment

Course Text

Classical Electrodynamics, Third Ed., J.D. Jackson (Wiley)

Recommended Supplemental Text

Introduction to Electrodynamics (3rd ed), D. J. Griffiths (Prentice Hall)

Evaluation

Homework (50%)

1. You are encouraged to discuss the problems with one another, but the detailed solutions that you submit must be your own, independent work.
2. Do not hesitate to seek help from me, in person, over the phone, or by email.
3. The point value of each problem is indicated in brackets. The total number of points for the semester will be ≈ 750 .
4. Homework will be due each class (except on days when there is an exam) and is due at the start of class.
5. The clarity of your solutions will factor significantly into your grade. It is not sufficient to write a few equations. You must define your variables, draw well-labeled figures where appropriate, and explain what you're doing. Use the distributed solutions to sample problems and homework problems as a guide for the level of detail required. Also, you must write legibly. I will not struggle to decipher handwriting; instead, I will simply assign zero points.
6. Each week, I will choose a fraction (possibly 100%) of the submitted problems to grade. Of course, I will not reveal in advance which problems will be graded. Your total earned points for each submission will be AB/C , where C is the total number of points in the graded problems, A is the number of points you earned on those problems, and B is the total number of points in the problems on which you made a serious effort.
7. Some of the homework problems will be taken from Jackson. There are several resources (e.g., web pages) where you can find detailed solutions of Jackson problems. You may not use these resources as you work on your solution, but you may use them to check your work. Note that even the best resources contain errors!
8. Unless explicitly stated, you may not use computer programs like Mathematica.
9. When a problem asks you to “show” something, this should be interpreted as “derive” rather than “verify”.

2 in-class exams (15% each)

Tentatively scheduled for Oct 6 and Nov 10.

Final exam (20%)

This will be held on Dec. 15, 4:30–7:15, in the same room as class.

Course Plan

Selected material from chapters 1 through 6 of Jackson, including:

1.1 through 1.11

2.1 through 2.10

3.1 through 3.3, 3.5 through 3.10

4.1 through 4.4, 4.7

5.1 through 5.12, 5.15 through 5.18

6.1 through 6.4, 6.7

Recommended Study Strategy

1. For each topic, lecture notes will be available on the course web site in pdf format. Before class, print out the notes and read the corresponding sections in Jackson (indicated at the top of each set of lecture notes). At this point, you do not need to master the material in Jackson, but familiarity with it will help you to keep up with the lecture.

2. During the lectures, structure your own note taking around the printed course notes. The pace will be too quick for you to write down everything on your own. Focus on writing down clarifications and extra detail not contained in the printed notes.

3. Only part of the class time will be devoted to lectures. We will also spend a lot of time working sample problems. I'll distribute these problems, as well as detailed solutions, before class. Please print these and bring them to class. You may want to jot additional notes on them.

4. During many classes, you will work exam problems from previous years as practice. Please bring the exam formulas sheets (distributed by email at the beginning of the semester) to each class.

5. After class, carefully review your lecture notes. Reread the relevant sections of Jackson, this time making sure that you have mastered the material. Make note of anything you don't understand and ask me about it at my office or at the next class.

6. Also after class, attempt to work the sample problems on your own, without using the distributed solutions or your notes (but do make use of the formulas sheets). If you get stuck, then refer to the solutions. Try the problem again later, and keep doing this until you can solve it unassisted. Some sample problems are only meant to develop a useful mathematical fact or technique. You should be familiar with the results in these cases, but do not need to follow this repeated-practice procedure. These problems include 2.5, 3.1, 3.5, 5.3, 5.4, and 6.1.

7. The homework assignments will be challenging. For many problems, you will probably need to make multiple attempts in order to achieve the full solution. For this reason, it is critical that you start working on the problem set shortly after it is assigned. Allow yourself plenty of time to seek help, both from me and from your classmates. I suggest that you form study groups and meet regularly to discuss the problems. But make sure that you've put in serious effort before meeting with your classmates!

8. After class, I will distribute, by email, solutions to the homework. Carefully study the solutions, regardless of how well you did on the problems. You may find that my solution differs from yours, and it can be very valuable to have the additional perspective. As with the sample problems, redo the homework problems until you can easily solve them without the use of aids (except for the formulas sheets).