

PHYSICS 430 - ELECTRICITY AND MAGNETISM - SPRING 2006
COURSE INFORMATION

Instructor: Victor DeCarlo
Office: 235 SC
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Office Hours: 2:30-4:00 PM, MWF
1:00-3:00 PM, T
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Required Text: D. Griffiths, *Introduction to Electrodynamics*, 3rd Ed.

Recommended Reading (in order of increasing mathematical sophistication): Feynman, Leighton, Sands, *The Feynman Lectures in Physics, Vol 2*; E. Purcell, *Electricity and Magnetism*; G. Pollack and D. Stump, *Electromagnetism*; J.D. Jackson, *Classical Electrodynamics*, 2nd Ed.

The books by Feynman and Purcell, while not shying away from the mathematics, are more conceptually oriented and contain a wealth of interesting examples. Pollack and Stump's textbook is one of the more recent entries into the undergraduate market and is very similar in tone and structure to Griffiths' book. Finally, utter the word "Jackson" in a gathering of physics graduate students and you are sure to elicit a shudder: it is the standard textbook for the year-long graduate course in electrodynamics and is infamous for the difficulty of a good number of its end-of-chapter problems.

ABOUT THE COURSE: Physics 430 is the upper level course in classical electrodynamics. The main goal of the course is to have you become familiar with the fundamental principles of electricity and magnetism as they apply in vacuum and within matter. Main topics include Coulomb's Law, Gauss' Law, Ampere's Law, boundary-value problems, and Maxwell's Equations. Course material will draw heavily on various mathematical techniques involving the use of vector calculus, power series expansions, and differential equations; you will need to apply these techniques yourself when solving problems. It is expected that most of your time outside of class will be devoted to reading the text and working on exercises.

GRADING: Course grades will be determined according to the evaluation scheme below.

Exam 1: 18%	Final Exam: 24%
Exam 2: 18%	Homework: 40%

The following grading scale will be used to determine your final letter grade in the course:

93-100 = A	90-92 = A-	87-89 = B+
81-85 = B	78-80 = B-	75-77 = C+
70-74 = C	67-69 = C-	64-66 = D+
59-63 = D	56-58 = D-	
00-55 = F		

EXAMS: Exams will be closed book/closed notes, but you will be allowed to bring a formula sheet to all exams. Exams will consist mainly of word problems but there may be a few conceptual questions for you to consider. The final exam will be comprehensive and is scheduled for Saturday, May 13, 8:30-11:30 AM; the dates of the other two exams are listed on the class schedule on the following page.

HOMEWORK: Griffiths' text contains a wonderful assortment of problems. Many problems are relatively straightforward while a few are quite challenging. During the semester I will have you do a large number of the textbook problems since this is really the best way to learn the material (and it gives you good preparation for the exams). I will ask you to turn in formal solutions to several problems each week and will grade each problem using a 0-10 scale.

In writing up solutions, you should follow the basic outline of the problem-solving framework introduced in Physics 120, with an emphasis on proper use of notation, careful attention to mathematical precision, and (as always) a brief discussion of the physical principles being brought to bear on the solution. I encourage you to work collaboratively on the problems but you should understand that when you write up solutions the work is to be your own (i.e., don't just copy someone's solution). Don't be shy about coming to me for help with the homework.

CLASS PARTICIPATION: I expect you to come to class regularly and on time. You should be prepared to discuss the textbook material and to have worked on the assigned homework problems. I reserve the right to adjust your final course score up or down by a few percentage points based on the quality and extent of your contributions in class.

CLASS SCHEDULE

	Monday	Wednesday	Friday
Jan 30 - Feb 3	Intro to the course	Secs. 1.2.1-1.3.1 Probs 1.,11, 1.12* , 1.13, 1.15(a), 1.18(b), 1.21 (a, b), 1.25(a,d), 1.28 (a)	Secs. 1.3.2-1.3.6 Probs 1.29* , 1.31, 1.32, 1.33*
Feb 6 -10	Secs. 1.4, 1.5 Probs 1.38, 1.42, 1.43(a,c), 1.46, 1.48* , 1.53*	Secs. 2.1.1-2.2.1 Probs 2.1(a,b), 2.2, 2.3, 2.5, 2.9	Secs. 2.2.2-2.2.3 Probs 2.12, 2.13, 2.15*
Feb 13 – 17	Secs. 2.3.1-2.3.4 Probs 2.20, 2.21, 2.22, 2.25(a,b)	Secs. 2.3.5-2.4.4 Probs 2.26* , 2.30, 2.31, 2.32*	Secs. 2.5.1-2.5.3 Probs 2.35* , 2.36, 2.37
Feb 20 – 24	Secs. 2.5.4-3.1.4 Probs 2.39, 2.43* , 2.46* , 3.2	Sec. 3.3.1 Probs. 3.12* , 3.13	Sec. 3.3.2 Probs 3.16, 3.17, 3.18*
Feb 27- Mar 3	Sec. 3.4 Probs 3.26, 3.28* , 3.31, 3.32* , 3.33	Catch-Up Day	Sec. 4.1 Probs 4.1, 4.2* , 4.5
Mar 6 – 10	EXAM 1	Sec. 4.2 Probs 4.10, 4.11, 4.14	Sec 4.3 Probs 4.15, 4.17
Mar 13 - 17	Sec. 4.4.1 Probs 4.18* , 4.19, 4.20	Sec. 4.4.3-4.4.4 Probs 4.26, 4.29* , 4.31, 4.32*	Catch-Up Day
Mar 20 – 24	Sec 5.1 Probs 5.1, 5.3, 5.4, 5.6*	Sec 5.2 Probs 5.8, 5.9, 5.10(a), 5.12*	Sec 5.3.1-5.3.3 Probs 5.13, 5.15
Mar 27 – 31	Spring Break	Spring Break	Spring Break
Apr 3 – 7	Sec 5.3.4-5.4.1 Probs 5.19, 5.22, 5.24	Sec 5.4.2-5.4.3 Probs 5.34, 5.35, 5.36*	Catch-Up Day Probs 5.57a, 5.58*
Apr 10 – 14	Sec 6.1 Probs 6.1, 6.3, 6.6	Sec 6.2 Probs 6.7, 6.8*	Sec 6.3 Probs. 6.12, 6.13
Apr 17 – 21	EXAM 2	Sec 6.4 Probs 6.16, 6.17*	Sec 7.1.1 Probs 7.1, 7.2
Apr 24 - 28	Sec 7.1.2 Probs 7.7, 7.8* , 7.10	Sec 7.2.1-7.2.2 Probs 7.12, 7.13* , 7.16, 7.18	Sec 7.2.3-7.2.4 Probs 7.20, 7.22, 7.26, 7.29
May 1 – 5	Sec 7.3.1-7.3.4 Probs 7.31, 7.32* , 7.33, 7.34	Sec 8.1.1 Prob 8.2	Sec 9.1 Prob 9.1, 9.3, 9.8
May 8 - 10	Sec 9.2 Probs 9.9, 9.10	Catch-Up and Review	
Comprehensive Final Exam: Saturday, May 13, 8:30-11:30 AM			

Solutions to problems followed by an asterisk are to be turned in for grading within a week of the day they are assigned. All other problems should be worked on by the date indicated.