Physics 15b: Electromagnetism
— Fall 2007 —

Tu/Th 11:30 AM–1:00 PM, Science Center A
http://www.courses.fas.harvard.edu/2701

Synopsis   This course studies Electricity and Magnetism as the second part of the introductory physics sequence.

Textbook   E. M. Purcell, *Electricity and Magnetism*, Second Edition.

Prerequisites   Physics 15a or 16, or written permission of the Head Tutor. Mathematics preparation at least at the level of Mathematics 21a (multi-variable calculus) taken concurrently is required. Vector calculus, div, grad and curl are used extensively—in principle, this is taught in the course. Students taking Mathematics 21a concurrently will likely find that some concepts are introduced in Physics 15b before they have seen them in Mathematics 21a. Some students may wish to postpone Physics 15b until they have completed Mathematics 21a.

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Lecture   The course will meet on Tuesdays and Thursdays from 11:30am – 1pm in Science Center A. Lectures will cover all the material in the textbook, as indicated in the schedule below. Your questions about the material are the most important thing for you to bring to the lectures, and you are encouraged to ask them as they occur to you.

You are strongly encouraged to attend the lectures. In case you do miss a class, the course will be videotaped, and you may contact the teaching staff for access to a particular lecture video.

Sections   Sections will start in the second week and meet weekly. You and the Teaching Fellow will discuss the material introduced in the lectures as well as the homework problems.

Homework   Problem sets are due on Fridays at 4 PM. Late homework will not be accepted. The graded problem sets will be returned to you at the section meetings. The solutions will be posted on the course web site.

Eleven problem sets will be given during the semester. (See the schedule below.) The 11th problem set is optional and will be due during the Reading Period. If you do complete the 11th set, you may use it to replace the lowest score among the earlier problem sets.

Study Groups   You are encouraged to work together with your peers on the problem sets (however all final written work must be your own). If you would like help finding a study group, please indicate your preferences on the questionnaire.

Laboratory   This year, we are in the process of developing a new series of lab assignments. We ask some of you to help by doing the new labs, while the rest of the class will do the regular labs. Both labs will require about 3 hours/week of work, and will be graded evenly.

The new labs are developed by Prof. Amir Yacoby. More information will be available at the first class meeting.

The regular labs (called the ZAP labs) are taught by Dr. Thomas Hayes Most of the ZAP labs are take-home; some are done in the lab classroom. See http://www.people.fas.harvard.edu/~thayes/15b for more information.

Exams   There will be two midterm exams on Thursday, October 11, and Tuesday, November 20 *(note that this is the Tuesday before Thanksgiving, and please plan accordingly!)* There will be a 3-hour final exam during the exam period.

Grade   The course grade will be determined by the weighted sum of the two midterm exams (15% each), homework (25% for 10 assignments), laboratory (15% for 7 labs), and final exam (30%).

Website   The course website http://www.courses.fas.harvard.edu/2701 will contain all the handouts, problem sets, and lecture notes. It will also contain any announcements (such as corrections to handouts).

Schedule   Below is the tentative schedule for the Fall 2007 semester.

Date	Lecture	Textbook	Lecturer	Homework
9/18 (Tue)	1. Electrostatics	1.1–8	JH+MM	#1 due on
9/20 (Thu)	2. Gauss's Law	1.9–15	JH	9/28 (Fri)
9/25 (Tue)	3. Vector Calculus	2.1, 2.3, 2.7, 2.9–11, 2.13–15	JH	
9/27 (Thu)	4. Electric Field, Potential	2.2, 2.4–6, 2.8, 2.16	JH	#2 due on 10/5 (Fri)
10/2 (Tue)	5. Physics vs. Mathematics	2.12	JH	
10/4 (Thu)	6. Conductors, Insulators	3.1–4	JH	#3 due on
10/9 (Tue)	7. Capacitors	3.5–8	JH	10/19 (Fri)
10/11 (Thu)	Midterm Exam 1 (through Lecture 5)			
10/16 (Tue)	8. Electric Currents	4.1–6	MM	#4 due on
10/18 (Thu)	9. Electric Circuits	4.7–11	MM	10/26 (Fri)
10/23 (Tue)	10. Moving Charges	5.1–6	MM	#5 due on
10/25 (Thu)	11. Accelerating Charges	5.7–9	MM	11/2 (Fri)
10/30 (Tue)	12. Magnetic Field	6.1–3	MM	#6 due on
11/1 (Thu)	13. Current and Mag. Field	6.4–7	MM	11/9 (Fri)
11/6 (Tue)	14. EM Induction	7.1–5	MM	#7 due on
11/8 (Thu)	15. Inductance	7.6–10	MM	11/16 (Fri)
11/13 (Tue)	16. AC Circuits	8.1–5	MM	#8 due on
11/15 (Thu)	17. Maxwell's Equations	9.1–3	MM	11/30 (Fri)
11/20 (Tue)	Midterm Exam 2 (through Lecture 16)			
11/22 (Thu)	Thanksgiving			
11/27 (Tue)	18. Electromagnetic Waves	9.4–7	MM	#9 due on
11/29 (Thu)	19. Electric Dipoles	10.1–6	JH	12/7 (Fri)
12/4 (Tue)	20. Dielectrics	10.7–11	JH	#10 due on
12/6 (Thu)	21. Dielectrics	10.12–15	JH	12/15 (Fri)
12/11 (Tue)	22. Magnetic Dipoles	11.1–6	JH	#11 due in
12/13 (Thu)	23. Magnetism in Matter	11.7–7	JH	Reading
12/18 (Tue)	24. Superconductivity	Appendices	JH	Period