

“I have also a paper afloat, with a electromagnetic theory of light which, till I am convinced of the contrary, I hold to be great guns.” - James Clerk Maxwell (1864)

1. INTRODUCTION TO PHYS 480:

The form of electrodynamics created by Maxwell in the 19th century is one of the most profoundly influential formulations in physics. It was a turning point in the history of science. For the first time, theoretical work unified distinct disciplines, electricity, magnetism, galvanism (basic circuits) and optics. It led to an understanding of light, gave us both new eyes and new ways of communicating in the form of new technologies (e.g. cell phones). The theory’s form and success were largely responsible for many of the developments in 20th century physics, including special relativity and the search for (elusive) unified theories. So Maxwell was right, the theory is great guns. In fact, there are few subjects we could choose to study which are as theoretically satisfying and full of practical application.

It is also a vast subject.

Fortunately we have a master to guide us through the material. Griffiths writes a clear and interesting text. He uses a classical presentation: Mathematical background is presented first, followed by kinematics, dynamics, and applications. We will begin with the Maxwells mathematics in modern form.

A note on the course information: All materials will be posted on the web server as well as being printed for classes (when appropriate). The advantage is that the documents can “live. (How alive any one document is remains to be determined...) As the semester progresses this syllabus and well as other documents will be modified. All versions will appear on the site and will be labeled by a version number as in the top right of this page. The information is at

2. TEXT:

David Griffiths, **Introduction to Electrodynamics** 3th edition.

3. COURSE INFO:

All materials will be available online. You can find them through the Courses tab on my home-page <http://academics.hamilton.edu/physics/smajor/index.html> or physserver. The latest versions will be labeled by a version number in the top right of the first page.

4. GRADES:

There are 3 parts to the grade:

- (1) Problem sets and discussion participation (30 %): Weekly problem sets will be due once a week on Thursday with final revisions due by the end of the day on Friday. Although I encourage you to work together you must write up your own solutions. The assignments will normally be posted and distributed at least one week prior to the due date. Your in-class contributions will be assessed for clarity and novelty.
- (2) Mid-term: (30 %) The exam will be sometime in October. Details to follow.
- (3) Final (40 %): Details to follow.

5. WEEKLY SCHEDULE

What follows is preliminary!

Week	Topic	Reading
27 August	Math. Rev. and Electrostatics	Ch 1 & 2 (108 pages !)
3 September	Math. Tech.	Ch 3
10 September	More Math. Tech.	Ch 3
17 September	Electric fields and matter	Ch 4
24 September	Magnetostatics	Ch 5
1 October	B-fields in matter	Ch 6
8 October	Electrodynamics	Ch 7
15 October	<i>Fall break</i> & Conservation Laws I	Ch 8
22 October	Conservation Laws II	Ch 8
29 October	Electromagnetic Waves	Ch 9
5 November	Exam	on Ch 1-9
12 November	Potentials	Ch 10
19 November	Radiation	Ch 11
26 November	<i>Thanksgiving</i> SR & E&M	Ch 12
3 December	SR & E&M	Ch 12
11 December		Final Tuesday 2-5PM

Enjoy!

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