Physics 303
Classical fields / Electrodynamics

Syllabus, Spring semester 2014

MWF 12:00-1:00 pm, in SC 203.

Instructor

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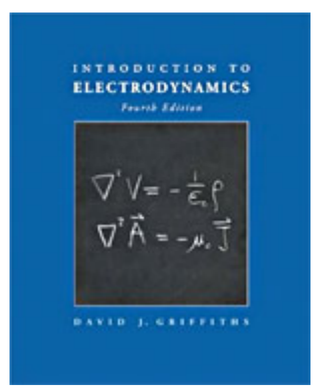
Content and learning objectives

The classical theory of electric and magnetic fields is developed using vector calculus. This is the course in which you're going to use everything you learned in Calc III, and then some! Topics include dielectric and magnetic materials, Maxwell's field equations, and electromagnetic waves. Prerequisites: Phys 203-204-General Physics I and II.

This is a 3 credit hour course. The College expectation is that you are spending 2-4 hours outside class for every hour in class for an *average* grae = 9-15 hrs / week.

Text / course materials



- **Required text** -- David J. Griffiths. *Introduction to Electrodynamics* (4th edition). Pearson, 2013.
- **Wolfram *Mathematica*** -- Available on GC lab computers. Getting started / reference
- **Lecture notes / schedule** -- Shortcut to remember: goshen.edu/fields; Best to bookmark: goshen.edu/physix/303/#today
- **Grades** -- ...and other course material on moodle.goshen.edu.
- **E-mail** -- Read your ___@goshen.edu e-mail regularly, or forward it to your favorite e-mail service.

Grading

minimum grade outcomes:

A/A- 93%/90
B+/B/B- 87%/83/80
C+/C/C- 77%/73/70
D+/D 67%/60
F < 60%

I *may* adjust this scheme down a bit (e.g. 89% might end up being good enough for an A), but I certainly won't adjust it up.

homework	**28%**
problem writeups (2)	**8%**
2 exams	**38%**
final exam	**23%**
participation	**3%**

Grades are intended to reflect the degree to which the mathematical content has been mastered - not the performance of one student in relation to others.

Problem writeups

These comprise two short writing assignments.

Chose two problems to write up in more detail. These should be:

- less-than-trivial problems from the ones at the end of chapters.
- Not problems that were assigned for another purpose.
- You must pick your own problem: No two people will work the same problem. You *may* consult other people about your problem.

You'll use Mathematica to write up a solution with equations, diagrams as appropriate, and text which explains the approach you took to the problem, and references the physical principles you're using. Like (some) writing assignments from other classes, you'll hand in a first draft of this, and after feedback, a final draft. The rubric used to grade this comprises these categories:

- **Exposition of the problem** - Copy out the statement of the problem. Use a different font to visually distinguish your work from the specification of the problem. Label the problem with chapter and problem number.
- **Diagrams and plots** - Use a diagram to sketch out the physical system, and label the names of quantities (angles, coordinates, etc). You may hand draw this! Include plots of functions as appropriate, for example to indicate maxima or minima, or equipotentials, or a potential energy surface, or otherwise enlighten the problem in some way.
- **Grammar and spelling** - Use a more formal voice than when speaking, e.g.

"a maxima" not "a max", "substitute in" rather than "plug in". Punctuation in physics papers is a unique issue. You should punctuate equations as if they were any other part of your writing: periods or commas frequently go at the end of a displayed equation.

- **Correctness of your solution** - Gotta make sure you do the problem right! See if you can do some sort of "sanity check" on your results as you go along.
- **Clarity of narration** - Think of your audience as other students in this class, with some general familiarity with the material. Name the principles and techniques you're using to solve the problem at each section of your problem. You may refer to equations in the textbook: give some context to say where such an equation comes from.
- **Math typesetting / notation** - Use real subscripts (not t0 when you mean t_0). Figure out how to get greek letters in Mathematica. Distinguish visually between vector and scalar quantities: scalars are usually displayed as non-bold italic quantities (Mathematica should do this automatically in math mode). Vector quantities are generally non-italic, and either have a little arrow over them, e.g. $\vec{\mathbf{b}}$, or else appear as bold face, e.g. $\mathbf{b}$. Mathematica commands will generally appear as a monospaced font like this "`Plot[ Sin[x],......]`" without you having to do anything special. When displaying definite integrals, use the ' notation to distinguish between the integration variable and the integration limits, e.g.

$$\int_{v_0}^{v(t)} \frac{dv'}{F(v')} .$$

  It may be useful to number equations to refer back to them, or put in a hand lettered "star" or other convenient symbol beside one that you wish to refer back to.

Disability accommodations

Goshen College wants to help all students be as academically successful as possible. If you have a disability and require accommodations, please contact the instructor or Director of the Academic Resource and Writing Center, Lois Martin, early in the semester so that your learning needs may be appropriately met. In order to receive accommodations, documentation concerning your disability must be on file with the Academic Resource and Writing Center, GL113, x7576, lmartin@goshen.edu. All information will be held in the strictest confidence. The Academic Resource and Writing Center offers **tutoring and writing assistance for all students**. For further information please see www.goshen.edu/studentlife/arwc/.

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WileyMCB - Maya Lin's Storm King Wavefield.