Final Project Instructions
(see below for important deadlines)

For your final project in this course you will solve a textbook-style problem, write up your solution as a formal paper, and present your solution to the class in a 15-minute talk. The goals of this assignment are to give you an opportunity to work a problem of your choice, to give you the experience of working to understand something in more depth than there is time for in a typical homework problem, to develop your written and oral communication skills, and to expose the whole class to a bit more variety of topics in electromagnetic theory.

First you must choose a problem. Your textbook is an excellent source of additional problems, but you may also consult other textbooks (look in the majors room or the library). You may also invent your own problem, if you have an idea that interests you. But wherever you find your problem, it shouldn’t be too easy or too hard. Aim for something that you can solve in a few hours at most, and write up in typical homework style in no more than a few pages. Please avoid problems that would be easy enough for an introductory physics course, but also avoid the Griffiths problems that are marked with an exclamation point (unless you’re feeling especially ambitious). Avoid problems from sections of the book that we’re not covering in this course.

I reserve the right to veto your choice of problem. Please inform me of your choice by email no later than Wednesday, November 20 (5:00 pm). Feel free to specify a second and even a third choice if you like. I will then either approve your choice or work with you over the next couple of days to modify it.

Once I’ve approved your problem choice, go ahead and work the problem as you would any other homework assignment. Turn in a hand-written solution of your problem by Monday, November 25 (5:00 pm). I’ll then check it over and, if necessary, work with you to correct it.

Then your real work begins. Think about how to present your problem to a reader or listener who has studied just as much physics as you have, but who has never seen or thought about your problem before. Write a detailed outline for your paper and talk, thinking carefully about how to break up the presentation into parts, how to label and describe each part, what illustrations will be helpful, and how to connect the pieces together.

One of the biggest challenges will be to motivate the problem for your audience. It is not acceptable to simply begin with “The problem says to do such and such.” Instead you have to explain, from scratch, why your problem is interesting and why your audience should care about the answer. This motivation, and a statement of the problem and its goal, will become the introduction to your paper and talk.

The main body of your paper and talk should be a step-by-step presentation of the solution to your problem, making everything as clear as possible and including illustrations whenever appropriate. While some of this presentation will necessarily involve algebraic symbol-pushing, you should endeavor to illuminate the meaning of each step with as much
physical insight as possible. If parts of the calculation are straightforward but lengthy, you may omit some of the algebraic steps and instead describe those steps in words.

Your paper and talk should end with a brief conclusion in which you summarize what you have accomplished, provide any further interpretation, and raise any further questions.

Please typeset your paper in \LaTeX, using the sample file linked from our course web site as a template. The paper should include an abstract, which summarizes its contents as concisely as possible. (Don’t confuse the abstract with the introduction, which is quite different, as described above.) The length of your paper should be between 5 and 10 pages. Naturally your paper should be written in your best English, with correct spelling, punctuation, grammar, and usage, structured logically in paragraphs and sections. See your textbook for hundreds of pages of excellent examples.

For your talk, please prepare electronic “slides” for delivery with PowerPoint or some other presentation software. An ideal length is about 8 to 12 slides. The slides should not include lengthy verbiage or algebra; instead focus on short phrases, important equations, and especially illustrations, which your audience can absorb visually while they also listen to your insightful explanations.

I will be more than happy to help with the technical aspects of preparing your papers and slides. I can show you how to copy equations from \LaTeX into PowerPoint, and how to import PowerPoint (or other) illustrations into a \LaTeX document.

You need not give a full-blown practice talk, but I will expect you to stop by and show me a complete draft of your slides no later than Friday, December 9. We will then go through your slides and discuss how you can improve them. Be sure to make an appointment to do this at a time that is compatible with both of our schedules.

The actual presentations will take place during our scheduled final exam time, 9:30 to 11:20 on Monday, December 9. I will provide refreshments. Each of you will have up to 15 minutes to deliver your presentation, plus five minutes for questions afterwards. Your papers are due no later than 5:00 pm that afternoon.