# PHYS514 General Information

Instructor: Brian DeMarco

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Textbook: *Atomic Physics*, by Christopher Foot

**Fall 2013 schedule:**

Tuesday, Thursday 11:00 am–12:20 pm

Meeting place: Ceramics 218

Office hours: Tuesdays 3-4 pm

**Prerequisites:**

I will expect everyone to have completed two semesters of undergraduate E&M and quantum mechanics. We can review specific material that you're not familiar with as we go along.

**Course goals:**

The goal of this course is to develop a functional understanding of and broad perspective on the physics relevant to modern (post late 1980s) atomic physics experiments. You should leave this course with a consistent, conceptual picture of atomic structure, the interaction of atoms with electromagnetic fields, and the nature of interactions between atoms. The point of this class is not to understand the nitty-gritty details behind the derivation of theoretical results. Rather, we will develop the skills necessary to do calculations relevant to experiments. Areas of special concentration will include methods for coherent control of atomic quantum states and the physics behind trapping and cooling technology (ion traps, magnetic traps, optical traps, magneto-optical traps, etc.).

This course will be useful and great fun even if you do not plan to pursue an atomic physics research topic. The interaction of light and matter (the real guts of this course) is an important subject in many research areas, from biophysics to physical chemistry. You can also view the subject matter of this course as applied quantum mechanics, and a great way to enhance your understanding of that subject.

**What will happen in class?**

***Before*** each lecture your responsibilities include:

1. Reading selected chapters from our textbook or other books on e-reserve. The chapters we will cover each class are listed on the syllabus. The textbook should be available from UIUC's bookstore; you can also buy it from amazon.com.
2. Occasionally you will read a journal article before you come to class. These assignments will be listed on the course syllabus.
3. Completing homework problems, generally due every two weeks.

***During*** each lecture we will:

1. Discuss any assigned journal articles.
2. Listen to a bit of lecture from me.

**Final Project**

There will be no exams or quizzes. There will be a final project, which will be worth 40% of your grade. Your final project will be a term paper centered on a recent r experimental atomic physics journal article. See the course website for more information on the term paper.

Homework sets and the final project will not be accepted late, unless you have an official excuse signed by the Emergency Dean or you must be out of town for a good reason (your wedding or a scientific conference are good reasons).

**Grading summary:**

Homework 60%

Final project 40%