COLORADOSCHOOLOFMINES

Subject: Engineering Physics Number: 361

Course Title: Intermediate Electromagnetism

Section: A

Semester/year: Spring 2016

Instructor or Coordinator: Dr. Patrick Kohl

Contact information: CTLM 224, 303-384-2303, pkohl@mines.edu

Office hours: M/W 3-4:00 pm, Th 10:00-11:50 am, Th 2-3:00 pm

Class meeting days/times: MWF 10:00-10:50 am

Class meeting location: CT 231

Web Page/Blackboard link (if applicable): http://ticc.mines.edu/csm/wiki/index.php/PHGN-361_Spring-2016

Teaching Assistant: Derek Fogel

Contact information: dfogel@mymail.mines.edu

Instructional activity: 3 hours lecture 3 semester hours

Course designation: Major requirement

Course description from bulletin: Solutions to the electromagnetic wave equation are studied, including plane waves, guided waves, refraction, interference, diffraction and polarization; applications in optics; imaging, lasers, resonators and wave guides.

Textbook and/or other requirement materials:

Recommended text: Electromagnetism, Pollack and Stump. Suggested alternative: Electrodynamics, Griffiths.

Student learning outcomes: At the conclusion of the class students…

1. will have demonstrated proficiency with several specific mathematical techniques that are relevant in electromagnetism, with a particular focus on separation of variables;

2. will have demonstrated the ability to lead others through the fundamental conceptual principles of electrostatics and magnetostatics using both oral and written media, with a particular focus on how sources create fields and how fields affect sources;

3. will have demonstrated a willingness to engage with and progress on electromagnetism problems that exceed their ability to solve comfortable and/or completely.

Brief list of topics covered:

1. Static Maxwell equations and boundary conditions (electrostatics and magnetostatics)
2. Electric potentials and potential energy
3. Solutions to Poisson's equation, including (but not limited to) separation of variables, images, and multipole expansions
4. Static E&M in matter – polarization, magnetization, and bound sources
5. An introduction to electrodynamics – Faraday's law

Policy on academic integrity/misconduct: The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining and fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student's academic achievements, and giving credence to the university's educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed.

The complete policy is online. The typical penalty for academic dishonesty of any kind is an F in the course.

Grade breakdown – Book reading: 5%

We will be moving fast, and we will not be re-doing every little thing from Phys 200. For lecture to make sense, it is imperative that you read the book sections noted on the course schedule before you come to the corresponding lecture. You will learn much more in lecture if you read than if you don't; more than enough to offset the additional time investment by reducing your study time later.

I'm well aware of the fact that college students don't often read textbooks, so as an incentive, 5% of the course grade comes from reading the book. This, of course, will have to be strictly on the honor system. At the end of the semester I'll ask you to report on how often you read the book and assign credit accordingly. Please take this seriously.

Lecture participation – 5%

We will be using clickers. Obtain one, register it at iclicker.com, and bring it to class. It is your responsibility to have it and maintain it (batteries, etc).

Homework – 30%

As you must have noticed by now, much if not most of the learning that happens in a physics course happens on the homework sets. We will have weekly homework, with problems from the book and from elsewhere. Homework will usually be assigned on Fridays and will usually be due on the following Friday.

Much of your homework score will be based on diagramming and explanation. I will post examples of what I have in mind. If you ever have any doubt as to what is expected, ask.

I realize that solution stashes and solutions manuals are readily available. Once again, I'll request that we use the honor system. Working off of old solutions (mine, another student's, someone else's online, etc) is not allowed, and counts as academic dishonesty. You will not need to get every point on every problem to get a good grade in the class, so don't let yourself feel pressured.

Do feel free to work in groups. Don't let the group do everything for you. Don't turn in identical homeworks.

Exams: 15%, 15%, 15%, 15%

We will have three exams during the semester, and one final exam. The first exam and the final will be traditionally-structured exams covering conceptual understanding and problem-solving.

One of the second or third exams will be an oral exam, one-on-one, in roughly the style of oral comprehensive exams in graduate school or oral technical interviews in industry. Being able to solve problems out loud in front of someone is a critical skill for any scientist or engineer. That skill gets neglected in courses with large enrollments, but we're going to make it happen. I think you'll find it quite satisfying. More details on the structure of the oral exam will follow. To better manage the rather large population this year, half of you will have an oral exam in place of exam 2, and half will do it for exam 3. If you're not doing an oral exam, you will be doing a traditional paper exam.

Final grading:

This is an upper-division physics course, so we will not use a straight 90/80/70/60 scale. The entire course will operate on a fairly generous curve. As an extreme example, if the top score on an exam is 37%, then 30 or above will be A territory. In other words, don't panic. You'll probably do fine in the course as long as you're working hard. But at the same time, this is a core physics course, not a survey-style elective. A's are not automatic, and it remains possible to fail.

Coursework return policy: Expect to receive graded homeworks and exams within a week of them being turned in.

Absence policy: If you have to miss a class for a legitimate purpose and you want to receive clicker credit for the day, notify the instructor ahead of time (when possible; soon after if not) and bring documentation. Note that CSM defines 'legitimate' as a medical issue, a death in the family, or an officially-sanctioned activity such as a varsity sports event. Everyone will receive two free excused absences for the semester, so **if you aren't going to miss more than two days total, no action is necessary on your part.**

Homework must be turned in before it is due to be graded – plan ahead.
If you will be absent during a scheduled exam, you **must** schedule a make-up time before you leave.

Detailed course schedule: See course wiki at above URL for the most up to date schedule and assignments