



**Subject: Engineering Physics**

**Number: 462**

**Course Title: Electromagnetic Waves & Optics**

**Section: A**

**Semester/year: Fall 2015**

**Instructor or Coordinator: Dr. Patrick Kohl**

**Contact information (Office/Phone/Email):** CTLM 224, 303-384-2303, pkohl@mines.edu

**Office hours:** M 10-11:50 am, W 11:00-11:50 am, Th 10:00-11:50 am

**Class meeting days/times:** MWF 3:00-3:50 pm

**Class meeting location:** CT 231

**Web Page/Blackboard link (if applicable):** [http://ticc.mines.edu/csm/wiki/index.php/PHGN-462\\_Fall-2015](http://ticc.mines.edu/csm/wiki/index.php/PHGN-462_Fall-2015)

**Teaching Assistant (if applicable):** Kirsten Blagg

**Contact information (Office/Phone/Email):** kblagg@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, 1<sup>st</sup> ed.

**Student learning outcomes: At the conclusion of the class students...**

1. will have solved a variety of open-ended problems in electromagnetism using numerical techniques, starting from first principles;
2. will have demonstrated the ability to lead others through the fundamental principles of electromagnetism using both oral and written media;
3. will have demonstrated a willingness to engage with and progress on electromagnetism problems that exceed their ability to solve completely.

**Brief list of topics covered:**

1. Dynamic Maxwell equations and boundary conditions
2. Plane and spherical electromagnetic waves
3. Normal and non-normal EM wave incidence, transmission and reflection
4. Waveguides

5. Gauges and retarded potentials
6. Radiation and scattering

**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.

### **Grading Procedures:**

Lecture/recitation participation – 10%

We will be using clickers. Obtain one and bring it to class. It is your responsibility to have it and maintain it (batteries, etc). Points are for productively contributing to class in addition to simply being present, which requires advanced reading and/or watching video lectures. Participation credit may include reading quizzes at the beginning of class.

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 be generally be assigned on Wednesdays and will be due on the following Wednesdays, with deviations as appropriate.

Much of your homework score will be based on diagramming and explanation. I will post examples of what I have in mind.

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 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: 20%, 20%, 20%

We will have two midterm exams during the semester, and one final exam.

## Grading Summarized:

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.

**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, so **if you aren't going to miss more than two days, no action is necessary on your part.**

## Homework:

- Homework must be turned in before it is due to be graded – plan ahead.
- Exams: If you will be absent during a scheduled exam, you should 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