

Fall 2015

Dr. AKM Newaz

PHYS 460 (Electricity and Magnetism II) Course Information

Objective:

The aim of this course is to make students familiar with the basic concepts and methods of electromagnetism, and Maxwell's equations. The first half of this course covers electrostatic and magnetostatic. The second part covers time-dependent phenomena in electromagnetism. After the course, students should have a working knowledge of electrostatic, Gauss's law and its solutions, electrostatics in matter fields, and magnetostatics in matter field. Students should also be able to solve, both conceptually and analytically, advanced undergraduate level problems in electromagnetism.

Instructor: Dr. Akm Newaz

Office: Thornton 317, Email: akmnewaz@sfsu.edu, akmnewaz@gmail.com

Office hours: Mon 10:10-11:10AM

Meeting Time and Place: Mon Wed Fri: 9:10-10:00AM, Thornton 428

Note on e-mail contact: please put [PHYS460:your name] at the beginning of the subject line, otherwise the e-mail will be responded.

Textbook: Griffiths: Introduction to Electrodynamics, 4th edition

Prerequisites: PHYS 230 or 231, PHYS 330, MATH 374 or PHYS 385, PHYS 360 all with grades of C-or better. If you do not satisfy this condition, you cannot take the course.

Last day of class: Friday, Dec 11

Midterm: October 21st, Wednesday 2015 (tentative)

Final: Wednesday, Dec 16 (8:00-10:30AM)

Grading: A student must earn at least 50% of the total possible points in order to receive a grade of B- or higher.

Homework 10%

Class participation-10%

Short quizzes 10%

Midterm Exam 20%

Final Exam 30%

Project 20%

Homework: Homework will be assigned regularly. The homework should be returned on time, and no late HW will be accepted. You are encouraged to discuss the assignments with other students, and stop by at office hours to ask questions. The final write-up must be yours. What you submit must be your own work. See <http://www.physics.sfsu.edu/policy/plagiarism.pdf> for department policy.

Short Quizzes: We will have (graded) short quizzes usually on MONDAY. (They likely will be during the first 10 minutes of class.) Quizzes will focus on important and fundamental issues from any chapter (before the most recent taught chapter) of the text book. Each quiz will be worth 10 points. The goal of these quizzes is to make sure that you understand and can use the very basic electricity and magnetism knowledge.

Midterm and final exams: There will be one midterm and one final exam. The midterm and final exams will be closed booked. You will be allowed to use only ONE page of formula sheet. Since you are allowed to use a formula sheet, it is expected that your solution or answer will be mathematically rigorous and correct.

Project: A final project consisting of a short report (a few pages) on a topic of interest related to the course should be submitted at the day of the Final exam. A list of related papers will be provided. Students will select one paper for the whole semester. It is possible to work in small groups for the programming/analytical calculation part, but everyone should write their own report or the report should be original. It is expected that the student will do necessary literature search and write a report (maximum 5 pages, Font 11). Appropriate reference citation is a must. Usage of numerical computer programming, such as MATLAB and MATHEMATICA is highly encouraged. Please write clear and concise sentences, and present carefully the questions you wish to address. Remember to define all the symbols you choose to use. Another student in the course should be able to follow your report. All the mathematical formulations should be clearly derived.

Excuses: If you have a valid excuse for missing an exam, quiz, or homework, send an email to arrange what to do about it, beforehand if at all possible. Specify the date and day you will be (or were) absent and the valid reasons. *Ex post facto* (after the fact) excuses will require validation and may not be acceptable.

Content:

This is the second semester of a two-semester introductory course on electromagnetism. The course will cover the following topics (mainly the material in the 7-12 chapters of Griffiths):

7. Electrodynamics: Ohm's law, Faraday's law, Maxwell's equations.
8. Conservation Laws: continuity equation, Poynting's theorem, conservation of momentum and angular momentum.
9. Electromagnetic Waves: wave equation in vacuum and matter, absorption and dispersion, wave guides.
10. Potentials and Fields: potential formulation, continuous distributions, point charges.
11. Radiation: dipole radiation, power radiation by a point charge, radiation reaction.
12. Electromagnetism and Relativity: Special Theory of Relativity, relativistic mechanics, relativistic electrodynamics.

STUDENTS WITH DISABILITIES:

Students with disabilities who need reasonable accommodations are encouraged to let the instructor know. The Disability Programs and Resource Center is available to facilitate the reasonable accommodations process. The DPRC, located in SSB 110, can be reached by telephone at 338-2472 (voice/TTY) or by e-mail at dprc@sfsu.edu. Special accommodations will be provided only with a formal request letter from DPRC