

PHYS 6610, Electromagnetic Fields II, Winter 2013

Instructor: Dr. A. Majumder, 316 Physics, Ph: 313-577-4569
email: abhijit.majumder@wayne.edu

Office Hours: by appointment.

1 Textbook:

Introduction to Electrodynamics, By D. J. Griffiths.

Other books of interest:

Electromagnetism, by G. Pollack and D. Stump,

Foundations of Electromagnetic Theory, by Reitz, Milford and Christy,

Classical Electrodynamics, J. D. Jackson.

2 Class timings

Monday-Wednesday-Friday 11:45am – 12:40pm.

3 Grading

Assignments: Assigned Bi-weekly, and due every 2 weeks
(40-50 points per assignment, total 6 assignments).

Midterm: 1 during class (Wednesday March 20th) open book (100 points).

Final Exam: 2.5 hours, closed book. (250 points)

4 Assigned work expectations:

It is expected that you will work on your assignments by yourself. Occasional discussion with your classmates is acceptable. Copying another assignment is not acceptable. You may discuss any questions about the assignments with me at any point.

5 Course Outline: topics to be covered,

Ohms Law, conductivity, inductance, magnetic energy, Maxwell's displacement current, Maxwell's equations in media, Poynting's theorem, stress tensor, Poynting vector, solutions of Maxwell's equations in free space, complex notation, radiation pressure, EM waves in matter, EM waves in conductors, dispersion in media, phase velocity and group velocity, wave guides, solving Maxwell's equations with Fourier transforms, Lienard Weichert potentials, Jefimenko's equations, electric dipole radiation, magnetic dipole radiation, radiation from a point charge, relativity, simultaneity, time dilation, length contraction, relative velocity, Lorentz transformations, fundamental invariant, contra-variant vectors, one-forms, metric, generalizing 3-velocity, proper-time, 4-velocity, 4-momentum, relativistic rest mass energy, massless particles, Compton scattering, conservation of 4-momentum in collisions, force and work done, four vector potential, the electromagnetic field tensor, the relativistic Lorentz force.