PHYS 6600, Electromagnetic Fields I, Fall 2011

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

Office Hours: by appointment.

1 Textbooks:

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 Grading

Homework: Assigned Bi-weekly, and due every 2 weeks.

Midterm: 1 during class (mid to late October).

Final Exam: 3 hours, open book.

3 Course Outline:

Mathematical preliminaries: Vector Analysis in Cartesian and Curvilinear coordinates.

Electrostatics: Electric Field, Gauss' Law, Coulomb's Law, Energy, Potential, Work, Conductors.

Mathematical methods for Electrostatics: Laplace Equation, Method of Images, Separation of Variables, Multipole Expansion.

Electrostatic fields in matter: Polarization, Bound Charge, Displacement, Dielectrics.

Magnetostatics: Lorentz Force Law, Biot-Savart Law, Ampere's Law, Vector Potential.

Magnetostatic fields in matter: Magnetization, Bound Current, Auxiliary Field H, Diamagnetism and Ferromagnetism.