

Physics 212
Fall Semester 2008
LL 511, MWF 9:10 – 10:00

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Course Website: <http://www.lehigh.edu/~jph7/website/Physics212/Physics212Fall2008.html>

Textbook: David J. Griffiths, “Introduction to Electrodynamics”,
3rd Edition, Prentice Hall, 1999

Grading: Homework – 20%
Midterm I – 20%
Midterm II – 20%
Final Exam – 40%

Accommodations for Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, University Center C212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

Topics Covered:

Vector Analysis

- Vectors and Vector Operations
- Derivatives
- Integrals
- Curvilinear Coordinates
- Dirac Delta Function
- Helmholtz Theorem

Electrostatics

- Coulomb’s Law
- The Electric Field
- Continuous Charge Distributions
- The Divergence and Curl of \vec{E} : Gauss’s Law
- The Scalar Potential
- Boundary Conditions on \vec{E} and V
- Energy Considerations
- Conductors
- Capacitors

Calculating Potentials

- Method of Images
- Separation of Variables
- Multipole Expansion

Electric Fields in Matter

- Atomic Polarizability
- Polarization and Bound Charges
- The Electric Displacement \vec{D}
- Linear Dielectric Materials
- Energy Considerations in Dielectrics
- Boundary Conditions for Dielectrics
- The Relationship between Susceptibility and Polarizability

Magnetostatics

- Magnetic Force
- The Biot-Savart Law
- The Divergence and Curl of \vec{B} : Ampere's Law
- The Magnetic Vector Potential
- Boundary Conditions on Magnetic Fields
- Magnetic Dipole Moments
- Energy of Magnetic Fields

Magnetic Fields in Matter

- Torques and Forces on a Magnetic Dipole
- Magnetism and Bound Currents: Paramagnetism and Diamagnetism
- The \vec{H} Field
- Linear Materials
- Ferromagnetism