

Course: Electromagnetic Theory
Textbook: Introduction to Electrodynamics (D.J. Griffith, 3rd edition)
Grading: Homework (40%), three exams (each 20%)

Subjects to be covered (tentatively)

- Chapter 1 Maths that are needed for this course
- Vector operation, components, triple products
 - Gradient, divergence, curl, second derivative
 - Line, surface, and volume integrals
 - Spherical and cylinder coordinates
 - Delta functions
- Chapter 2 Electrostatics
- Coulomb's law, electric fields
 - Gauss's law, divergence and curl of electric fields
 - Electric potential, Poisson's equation, boundary conditions
 - Conductors, forces on conductors, and capacitors
- Chapter 3 Special techniques
- Laplace's equation
 - Method of images
- Chapter 4 Electric fields in matters
- Dipoles and polarization
 - Electric fields generated by bound charges
 - Electric displacements, Gauss' law for dielectrics
 - Linear dielectrics, capacitors with dielectrics
- Chapter 5 Magnetostatics
- Forces on moving charges and on current
 - Biot-Savart law
 - Ampere's law, curl and divergence of B
 - Boundary condition for B, Magnetic vector potential
- Chapter 6 Magnetic fields in matters
- Magnetic moments of atom, magnetization
 - Magnetic fields generated by bound currents
 - Auxiliary field, its relationship with magnetization
- Chapter 7 Electrodynamics
- Generation of voltage power, Faraday's law
 - Induced electric fields, inductance
 - Maxwell's equations

Office: Physics 207; **Office Hours:** M (3:30-5:00PM), W (1:30-3:00PM)