Physics 503 Electromagnetic Theory
Spring 2009 Instructor: Dr. Don Summers 915-7032
Lewis Hall 228 TTh 9:30-10:45 summers@phy.olemiss.edu
Office: Lewis Hall Room 221 Text: Introduction to Electrodynamics
Office Hours: TTh 2-3 Griffiths, 3rd edition

Date	Subject	Read These Chapters
22 Jan	Lorentz Force Law	5
27 Jan	Diagnostic Test	
29 Jan	Boundary Conditions	5
3 Feb	Dia- Para-, Ferromagnets. Torque. Atomic Orbits	6
5 Feb	Bound Currents, H field	6
10 Feb	Ampere's Law with matter, Permeability	6
12 Feb	Electromotive Force, Ohm's Law	7
17 Feb	Faradays's Law, Inductance, B Field Energy	7
19 Feb	Maxwell's Equations, Boundary Conditions	7
24 Feb	FIRST MIDTERM EXAM	
26 Feb	Continuity Equation and Poynting Vector	8
3 Mar	Maxwell's Stress Tensor, Conservation of p and L	8
5 Mar	Electromagnetic Waves in One Dimension	9
10 Mar	Boundary Conditions, Polarization	9
12 Mar	Vacuum/Matter Waves, Absorption/Dispersion, Wave Guides	9
24 Mar	SECOND MIDTERM EXAM	
26 Mar	Potential Formulation, Gauge Transformations	10
31 Mar	Retarded Potentials, Lefimenko's Equations	10
2 Apr	Lienard Wiechert Potentials, Moving Charge Fields	10
7 Apr	Dipole Radiation, Power Radiated by a Point Charge	11
9 Apr	Circular Motion and Radiation, Radiation Reaction	11
14 Apr	Lorentz Transformations between frames of reference	12
16 Apr	Time Dilation/Length Contraction, Relativistic Mechanics	12
21 Apr	Relativistic Momentum and Energy	12
23 Apr	Magnetism as a Relativistic Phenomena, Tensors	12
28 Apr	Research Papers	
30 Apr	Research Papers	
7 May	COMPREHENSIVE FINAL EXAM, 8:00 AM, Thursday	

Grading: Homework 25% Research Paper 15% Midterms 30% Final 30%

Learning Objectives: Learn how to generate magnetic fields from currents. Become proficient with Maxwell's equations. Propagate electromagnetic waves. Generate electromagnetic radiation. Calculate relativistic motion. Reasonable accommodations for students with disabilities will be provided.

Research papers will be start from the following.

"Muon acceleration to 750-GeV in the Tevatron tunnel for a 1.5- TeV muon collider," http://arXiv.org/pdf/0707.0302

"6D muon ionization cooling with an inverse cyclotron," http://arXiv.org/pdf/physics/0510034

Graduate students may work extra problems.

The research paper fosters independent learning as one must do professionally.