

PHYS 8201: Advanced Electromagnetic Theory I

Instructor: W. M. Dennis, Room 201

Text: *Classical Electrodynamics*, 3rd Ed., John D. Jackson, (Wiley, 1999).

Reference: *Introduction to Electrodynamics*, 3rd Ed., David J. Griffiths, (Prentice Hall, 1999).

Reference: *Modern Problems in Classical Electrodynamics*, Charles A. Brau, (Oxford, 2004).

Reference: *Classical Electricity and Magnetism*, 2nd Ed., Wolfgang K. H. Panofsky and Melba Phillips, (Dover, 2005).

Reference: *The Classical Theory of Fields*, 4th Revised English Ed., L. D. Landau and E. M. Lifshitz, (Elsevier, 1975).

Reference: *Electrodynamics of Continuous Media*, 2nd Ed., L. D. Landau, E. M. Lifshitz and L. P. Pitaevskii, (Elsevier, 2004).

Office Hours: Will arrange in class when you know your schedules.

Exams: Test I, Test II, Final (All Closed Book and Cumulative)

Excused Absences: An excused absence for any test will cause the final exam grade to be substituted for that test grade.

Homework: Will assign problems. Selected Problems will be graded.

Grade: Total Grade = (Homework + Projects + Participation + Test I + Test II + Final)/6

Grading Scheme: Use of the plus/minus system is a requirement – it is the only grading system approved for the University of Georgia.

A	\equiv	[85, 100]	$A-$	\equiv	[82.5, 85)			
$B+$	\equiv	[80, 82.5)	B	\equiv	[70, 80)	$B-$	\equiv	[67.5, 70)
$C+$	\equiv	[65, 67.5)	C	\equiv	[55, 65)	$C-$	\equiv	[52.5, 55)
D	\equiv	[40, 52.5)	F	\equiv	[0, 40)			

Academic Honesty: The University of Georgia has a comprehensive policy on academic honesty, described in a document entitled A Culture of Honesty. This document is available through the Office of the Vice President for Instruction or online at <http://www.uga.edu/ovpi/>. You are responsible for knowing and understanding this policy.

Topics:

1. Preliminary Considerations
2. Selected Topics in Electrostatics
 - (a) Introduction to Electrostatics
 - (b) Boundary Value Problems in Electrostatics
 - (c) Boundary Conditions and Uniqueness
 - (d) Multipoles, Electrostatics of Media, Dielectrics
 - (e) Numerical Techniques
3. Selected Topics in Magnetostatics
 - (a) Amperes Law
 - (b) Vector Potential
 - (c) Boundary Value Problems
 - (d) Faradays Law
 - (e) Energy in the Magnetic Field
 - (f) Numerical Techniques
4. The Maxwell Equations
 - (a) The Maxwell Equations
 - (b) Vector and Scalar Potentials
 - (c) Gauge Transformations
 - (d) Green Functions
 - (e) Poynting's theorem
 - (f) Numerical Techniques
5. Electromagnetic Waves in Linear Dispersive Media
 - (a) Plane Waves
 - (b) Linear Media
 - (c) Reflection and Refraction at Surfaces
 - (d) Numerical Techniques
6. Radiating Systems
 - (a) Fields and Radiation of a Localized Oscillating Source
 - (b) Electric Dipole Fields and Radiation
 - (c) Center-Fed Linear Antenna
 - (d) Multipole Expansion of EM Fields
 - (e) Numerical Techniques