Physics 621 Syllabus

8/20/2012

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- **Office hours:** I am happy to see you any time but call to make sure I am in as my schedule is irregular. Afternoons 1-3 pm is the best time span to catch me.

Text: Classical Electricity and Magnetism, Panofsky and Phillips, Dover Publications, Mineola, New York (2005) - re-publication of the Second Edition of the text

Suggested references:

Wyld, *Mathematical Methods for Physics*, Perseus books (1999) Griffiths, *Introduction to Electrodynamics*, Addison Wesley(1999) Abramowitz and Stegun, *Handbook of Mathematical Functions*, Dover Jackson, *Classical Electrodynamics*, John Wiley & Sons

Grading:

3 Tests
2 Homework and Pop Tests
1 Notebook
2 Final
8

100-87.5	A
87.5-75	В
75-62.5	С
62.5-50	D
<50 F	

Regular attendance is expected. Every class is important. Please do not come late. Homework is to be turned in at the beginning of class. Every absence in excess of three will deduct 3% from the final average.

Goals:

To develop an understanding of Electricity and Magnetism and to develop your math skills as applied to physics.

Chapters 1-6 develop the theoretical basis for electrostatics and teach solution methods for electrostatics problems. Chapters 7-8 perform the same type of development for the magnetic field from steady currents. Chapters 9 and 10 formalize Maxwell's Equations which extend electrostatics and magnetostatics and investigate the energy relations in general fields. Chapters 11, 12 and 13 investigate implications of Maxwell's equations for waves and magnetohydrodynamics.

Expectations:

You are expected to read the text material before class and after class. It is expected that you will be able to reproduce any derivation presented on tests and the exam. It is required that you take notes in class or print out my notes and annotate or recopy these notes after class so that you can use these notes to study. The notebook should also contain graded homework and tests and their corrections. The notebook will be taken up and graded once during the semester and at the end of the semester. The problems in this course are similar to and often derived from research problems. You should study the material before working the problems. Solving these will develop your ability to do independent research. Some of the homework problems are difficult. You should start working on the problems early to allow time to think about the difficult ones.

University of Mississippi Creed:

The University of Mississippi is a community of learning dedicated to nurturing excellence in intellectual inquiry and personal character in an open and diverse environment. As a voluntary member of this community:

I believe in respect for the dignity of each person

I believe in fairness and civility

I believe in personal and professional integrity

I believe in academic honesty

I believe in academic freedom

I believe in good stewardship of our resources

I pledge to uphold these values and encourage others to follow my example.

The syllabus below is subject to change to accommodate instruction and/or student needs.

Date	Chapter	Homework Due
Aug 20	Electrostatics, 1-1	
Aug 22	Electric field, Coulomb's law, 1- 2,3,4	
Aug 24	Potential, multipole fields, 1-4,5,6	
Aug 27	Singularities, volume distribution of dipoles	Solution to undergrad test
Aug 29	Conclude Ch 1, Boundary conditions 2- 1,2	<u> </u>
Aug 31	Electric field in media, 2- 2,3	
Sep 5	Polarizability, 2-3,4	Problem set 1
Sep 7	Solution of potential problems, 3, 1,2,3	
Sep 10	Inversion, method of images, separation of variables, 3-4,5,6	Problem set 2
Sep 12	Chapter 1 problem discussion	
Sep 14	2-D potential problems, 4- 1,2,3,4	
Sep 17	Complex mappings, 4- 4,5,6,7,8	Problem set 3
Sep 19	Harmonics, 4-9,10	
Sep 21	Complete Harmonics, Chapter 3 problem discussion	
Sep 24	3-D potential problems, 5- 1,2,3,4	
Sep 26	Test 1, Ch 1-3	Test 1
Sep 28	Energy and force, 6- 1,2,3	Last day to drop
Oct 1	Symmetric potentials, charged ring, cylinder 5- 6,7,8,9,	Problem set 4
Oct 3	Test 1 discussion, Thermo, Thomson's theorem,	
Oct 5	Ch 4 problem discussion, Stress tensor, 6- 3,4,	
Oct 8	Stress tensor, Dielectrics, dielectric liquids, 6-6	Problem set 5
Oct 10	Steady currents, Ohm's Law, EMF, 7-1,2,3,4	
Oct 12	Magnetic interactions, induction, potential, 7-6,7,8	
Oct 15	Types of currents, Magnetic moments 7-9,10,11	Problem set 6
Oct 17	Magnetization, Magnetic field intensity, 7-11,12 and 8-1,2	
Oct 19	Permeable media, vector potential, 8- 3,4,5,6,7	
Oct 22	Solution using scalar and vector potential 8-6,7,8	Problems set 7
Oct 24	Solutions using vector potential 8-9 Homework 7 discussion	
Oct 26	Maxwell's equations 9- 1,2,3,4,5	
Oct 29	Energy, force, momentum 10- 1,2,3	Problem set 8
Oct 31	Magnetic force, E&M energy 10- 4,5	
Nov 2	Test 2	Test 2
Nov 5	Momentum 10 - 6, Wave equation 11- 1	
Nov 7	Plane waves, radiation pressure 11-2,3	Problem set 9
Nov 9	Moving media 11-4	
Nov 12	Metallic reflection 11-6	Problem set 10
Nov 14	Magnetohydrodynamics 12-1,2	
Nov 16	Waves and metallic boundaries 13 - 1,2	Problem set 11
Nov 19-23	Thanksgiving vacation	
Nov 26	Rectangular boundaries, cavities 13- 4,5	Problem set 12
Nov 28	Test 3	Test 3
Nov 30	Wave guides 13-6, review	
Dec 3	Final Exam 8:00am	