Physics 621 Syllabus

8/22/2011

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Office hours: call to make sure I am in, afternoons 1-3pm. Other times by appointment.

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
- <u>2 Final</u>

7

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

Academic Regulations:

Regular attendance is expected. Every class is important. Please do not come late. Homework is to be turned in at the beginning of class.

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. I highly recommend that you take notes in class and annotate or recopy these notes after class so that you can use these notes to study. The problems in this course are similar to and often derived from research 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 so that if you need to read other texts or go to the library you will have time to do so.

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

Date	Chapter	Homework Due
Aug 22	Electrostatics, 1-1	
Aug 24	Electric field, Coulomb's law, 1- 2,3,4	
Aug 26	Potential, multipole fields, 1-4,5,6	
Aug 29	Singularities, volume distribution of dipoles	
Aug 31	Conclude Ch 1, Boundary conditions 2- 1,2	
Sep 2	Electric field in media, 2-2,3	
Sep 7	Polarizability, 2-3,4	Problem set 1
Sep 9	Solution of potential problems, 3, 1,2,3	
Sep 12	Inversion, method of images, separation of variables, 3-4,5,6	Problem set 2
Sep 14	Chapter 1 problem discussion	
Sep 16	2-D potential problems, 4- 1,2,3,4	
Sep 19	Complex mappings, 4- 4,5,6,7,8	Problem set 3
Sep 21	Harmonics, 4-9,10	
Sep 23	Complete Harmonics, Chapter 3 problem discussion	
Sep 26	3-D potential problems, 5-1,2,3,4	
Sep 28	Symmetric potentials, charged ring, cylinder 5- 6,7,8,9,	Problem set 4
Sep 30	Energy and force, 6- 1,2,3	
Oct 3	Test 1	Test 1, Last day to drop
Oct 5	Test 1, Chapter 4 discussion	
Oct 7	Thermo, Thomson's theorem, Stress tensor, 6- 3,4,	
Oct 10	Stress tensor, Dielectrics, dielectric liquids, 6-6	Problem set 5
Oct 12	Steady currents, Ohm's Law, EMF, 7-1,2,3,4	
Oct 14	Magnetic interactions, induction, potential, 7-6,7,8	
Oct 17	Types of currents, Magnetic moments 7-9,10,11	Problem set 6
Oct 19	Magnetization, Magnetic field intensity, 7-11,12 and 8-1,2	
Oct 21	Permeable media, vector potential, 8-3,4,5,6,7	
Oct 24	Solution using scalar and vector potential 8-6,7,8	Problems set 7
Oct 26	Solutions using vector potential 8-9 Homework 7 discussion	
Oct 28	Maxwell's equations 9- 1,2,3,4,5	
Oct 30	Energy, force, momentum 10- 1,2,3	Problem set 8
Nov 2	Magnetic force, E&M energy 10- 4,5	
Nov 4	Test 2	Test 2
Nov 7	Momentum 10 - 6, Wave equation 11- 1	
Nov 9	Plane waves, radiation pressure 11-2,3	Problem set 9
Nov11	Moving media 11-4	
Nov 14	Metallic reflection 11-6	Problem set 10
Nov 16	Magnetohydrodynamics 12-1,2	
Nov 18	Waves and metallic boundaries 13 - 1,2	Problem set 11
Nov 21-25	Thanksgiving vacation	
Nov 28	Rectangular boundaries, cavities 13- 4,5	Problem set 12
Nov 30	Test 3	Test 3
Dec 2	Wave guides 13-6, review	
Dec 6	Final Exam 8:00am	