

Physics 621 Syllabus

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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.

Class schedule and location: 8:00-8:50 MWF, Room 1128 NCPA

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

Reitz, Milford and Christy, *Foundations of Electromagnetic Theory*, 4th Edition, Addison-Wesley (1993).

Grading:

2 Tests
2 Homework and Pop Tests
1 Notebook
2 Final
7

100-87.5	A
87.5-75	B
75-62.5	C
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. 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 and 12 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 evaluated once during the semester and then will be taken up and graded the end of the semester. See the rubric at the end of the syllabus. 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 26	Electrostatics, 1- 1	
Aug 28	Electric field, Coulomb's law, potential, singularities 1- 2,3,4,5,6	
Aug 30	Point charges, dipole fields, 1- 7,8,9	
Sep 2	Labor Day Holiday	
Sep 4	Volume distribution of dipoles 1-9,10	Solution to undergrad test
Sep 6	Boundary conditions 2- 1,2	
Sep 9	Electric field in media, Polarizability 2- 2,3,4	
Sep 11	Solution of potential problems, 3, 1,2,3	Problems CH 1
Sep 13	HW 1 and Undergrad test solution discussion	
Sep 16	Inversion, method of images, separation of variables, 3- 4,5	Problems CH 2
Sep 18	Separation of variables, 3-6	
Sep 20	2-D potential problems, 4- 1,2,3,4	
Sep 23	Complex mappings, 4- 4,5,6,7	
Sep 25	Multiple angle complex mappings, Harmonics, 4- 9,10,11	Problems CH 3
Sep 27	Complete Harmonics, Chapter 3 problem discussion	
Sep 30	Test 1 Chapters 1-3	Test 1
Oct 2	Test 1 discussion 3-D potential problems, 5- 1,2,3,4	
Oct 4	3-D potentials 5-4,4,5,6,7	
Oct 7	Symmetric potentials, charged ring, cylinder 5- 6,7,8,9,	Last day to drop, Problems CH 4
Oct 9	Thermo, Thomson's theorem, Energy and force, 6- 1,2,3	
Oct 11	Stress tensor, Dielectrics 6- 3,4,	
Oct 14	Ch 4 problem discussion, Dielectrics, dielectric liquids, 6- 6,7	Problems CH 5
Oct 16	Steady currents, Ohm's Law, EMF, 7- 1,2,3,4	
Oct 18	Magnetic interactions, induction, potential, 7-6, 7,	
Oct 21	Types of currents, Magnetic moments 7- 8, 9,10,11	Problems CH 6
Oct 23	Magnetization, Magnetic field intensity, 7- 11,12	
Oct 25	Permeable media, vector potential, 8- 1,2,3,4,5,6	
Oct 28	HW discussion, Solution using scalar and vector potential 8-7,8	
Oct 30	Vector potential in 2-D, in cylindrical coordinates 8-8,9	Problems CH 7
Nov 1	Solutions using vector potential 8-9, Maxwell's Equations 9-1,2	
Nov 4	Moving media 9-3,4,5, Energy, force relations 10-1,2	Problems CH 8
Nov 6	HW discussion, Test discussion, Magnetic force, E&M energy 10- 2,3,4,5	
Nov 8	Test 2- Chapter 4-8	Test 2
Nov 11	Magnetic force, E&M energy 10- 2,3	
Nov 13	Momentum 10 - 4,5,6	
Nov 15	Plane waves, radiation pressure 11- 1,2,3	Problem set 9
Nov 18	Moving media 11- 4	
Nov 20	Reflection and refraction 11-5	Problem set 10
Nov 22	Metallic reflection, Group velocity 11-6,7	
Nov 25-29	Thanksgiving vacation	
Dec 2	Magnetohydrodynamics (from Reitz, Milford and Christy)	Problem set 11
Dec 4	Magnetohydrodynamics	
Dec 6	Chapter 11 and 12 discussion, Exam discussion	Problem set 12
Dec 9	Final Exam 8:00am - Chapter 1-12, weighted to Chapters 9-12	

Rubric for grading notebooks:

1. 50% - print out class notes. Compile home works and tests. Bind or put in ring binders.
2. 20% - annotate note - add additional math materials

Or

25% - recopy and correct notes adding annotation and math notes

3. 20% - correct and rework wrong home works and tests
4. 5% - table of contents, chapter outlines and or summaries