

Syllabus
Phy4324, **Electromagnetism II**
Fall 2011

• **Instructor:**

Peter Hirschfeld, NPB 2156, Professor of Physics with interests in theory of superconductivity and matter at low temperatures.

Office Hours: Tues. 6th period, Wed. 6th period (12:50) Appointments will gladly be scheduled for those students who cannot make official hours.

- **Text:** D. Griffiths, Introduction to Electrodynamics, 3rd edition Prentice-Hall, 1999.

• **Other Recommended Texts:**

1. E.M. Purcell - Electricity & Magnetism (ISBN-13: 978-0070049086)
2. J.D. Jackson - Classical Electrodynamics (ISBN-13: 978-0471309321)
3. R.P.Feynman, R. B. Leighton and M. Sands, The Feynman Lectures on Physics, California Institute of Technology, 1966, VII.

• **Course Description:**

Second semester of an intermediate level course on electromagnetism. Fundamentals of electromagnetic fields, time dependent and interference phenomena as developed by Ampere, Faraday, Lorentz, and Maxwell in the 19th century, which in turn provides the foundation for a number of advanced topics in physics, such as electromagnetic radiation, wave optics, antennas, diffraction theory, waveguides, nonlinear optics, synchrotrons, etc.

• **Prerequisites:**

PHY3323, plus one year of general physics with calculus, or permission from a department undergraduate advisor is required. It is recommended -but not required-that before taking PHY4324, students take Physics C, complete the calculus sequence, and have had some exposure to ordinary differential and partial differential equations.

• **Required Work:**

Homework:

The weekly problem sets represent by far the most important element of the course, and where you will learn the most. I encourage you to work on them in groups if you like; the problems will occasionally be difficult and may require more than one head! However, be convinced in the depths of your soul that letting others do the work for you will lead to disaster at test time. A good technique for many students is to try all the problems individually, then get together in a group for the tough ones.

Problem sets will be handed out every Friday, and be due the following Friday. Each problem set will be worth a total of 10 points, and your grade will decay 4 points for the first day it is late after the solutions are posted, plus a further 1/2 a point for each subsequent week. I will drop the lowest two homework grades at the end of the course. My goal will be to hand the problem sets back Friday one week after receiving them, but occasionally other considerations will interfere, and I ask for your understanding.

Tests:

There will be two in-class tests and a final examination. The lowest percentage score of the 2 tests or the final will be dropped. Due to this policy, no makeup tests will be allowed.

You must bring writing instruments and a student identification card with a photo for all tests and the final. All necessary paper will be provided, and calculators will be allowed, but will normally not be needed. One formula sheet handwritten by the student front and back will be allowed for each test. On the final two sheets are allowed.

In-class test 1	NPB 1002, Mon., Sept. 24
In-class test 2	NPB 1002, Mon., Nov. 5
Final	Fri., Dec. 14 7:30am-9:30 am.

Term paper:

An optional (“extra credit”) library/research paper, topic to be decided in consultation with me, will be due Nov. 28. A typed one-page outline and tentative bibliography must be submitted by Oct. 3, or this paper cannot be turned in for credit. Paper must a) thoroughly review an application of electromagnetism not covered in standard textbooks; or b) present a “research-style” calculation of an advanced electromagnetism problem, using analytical, numerical, or symbolic (e.g., Maple, Mathematica or Maxima) methods; or c) design a new electromagnetism experiment for the advanced undergraduate laboratory. *Sources must include formally published books or articles and all works used must be cited professionally. All papers must be submitted electronically in .pdf form, and will be checked by Turnitin.*

Grading Policy:

The various components of your final grade will be weighted as follows:

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|---|
| <ul style="list-style-type: none">– Tests 1,2 & final after 1 drop: 70%– Homework: 30%– * Optional term paper: +5% extra credit |
|---|

There will be *no* “extra credit” (apart from the term paper) under any circumstances.

Letter grades will be assigned according to a “curved” distribution. However, the following minimum scores will guarantee the following grades: 85-A, 82-A-, 80-B+, 72-B, 69-B-, 65-C+, 60-C, 57-C-, 54-D+, 50-D. For example, depending on the “curve”, a score of 72% may be sufficient for a B+. Your actual raw percentage score should not be compared to those you receive in other courses. Because physics involves very different kinds of skills from other science and mathematics courses, even very good students will generally not solve all parts of most problems correctly. Demonstrating that you understand a problem even if you cannot solve all its parts will result in partial credit.

If you feel your test has been unfairly or improperly graded, you are welcome to present your test booklet for regrading. However, the entire exam is then subject to regrading, and the final grade may be lower! You are responsible for all material covered in the textbook and in lecture, including any announcements made or special handouts distributed in lecture. If you must be absent during a given lecture, check with a friend to make sure you know what was covered.

Makeup policy: Since the policy of dropping tests and homeworks is very generous, no makeups are allowed.

How to succeed in Physics 4324:

- It is expected that a successful student in this course will invest at least twelve hours of studying and problem-solving per week outside of class. Do not expect a good grade if you are not prepared to work this much.
- Read the assigned text before coming to lecture. The importance of this cannot be overemphasized.
- Study with your fellow students.
- Get help if necessary. The physics student services office maintains a list of well-qualified tutors.
- If you are falling behind/not understanding the material, talk to me earlier rather than later!

• **Web page**

Course announcements, schedule, homework & solutions, as well as reviews of lectures and this syllabus in its entirety will be posted at <http://www.phys.ufl.edu/~pjh/teaching/phy4324/>. I will in addition post grades and some materials on e-learning, and students can use this facility to post and discuss questions and comments on the course.

• **Disabilities (Accommodations)**

Students who will require a classroom accommodation for a disability must contact the Dean of Students Office and request proper documentation. Upon bringing that documentation to the Instructor, the student will be given the appropriate accommodations. No accommodations are available to students who lack this documentation.

It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed. The instructor will not remind the student to schedule accommodations prior to each quiz or exam. If you require extra time for in-class work, you must initiate this request at least seven days before the exam or quiz.

• **Academic Honesty**

All students are required to abide by the principles of academic honesty expressed in the Student Honor Code. Consistent with university policy, any incident of academic dishonesty in this course will be reported to the Dean of Students Office. It is normal and reasonable for students in this physics course to work together on homework assignments, but certain other activities are unacceptable: academic dishonesty includes plagiarism, fabricating information, giving or receiving any unauthorized assistance on academic work, and interfering with the academic work of other students. Submitting homework solutions that were simply copied or transcribed from another student, a book, or a website is clearly dishonesty, because it is not your own work. Supplying a false or fabricated excuse for missed academic work is also academic dishonesty. If the incident is the student's first offense at UF, the student will receive a failing grade in PHY4324. If not, the Dean of Students Office will decide the appropriate sanction.

Students sometimes ask why such an emphasis is placed on plagiarism, etc. In the view of the instructor this is a professional rather than a moral issue. As faculty, we are trying to train students to create and discover new knowledge. An attitude which allows the recycling of old knowledge is clearly detrimental to such a goal. We therefore create academic structures to discourage such recycling and encourage you to think for yourselves.

The Dean of Students Office website has further details on academic honesty policies at UF. In particular, those of you planning to write term papers please visit <http://web.uflib.ufl.edu/msl/07b/studentplagiarism.html>.

• **Religious Holidays**

Major religious observances will be accommodated. It is university policy, however, that the student must inform the instructor of religious observances that will conflict with class attendance or other activities, prior to the class or the occurrence of that activity. Since major religious holidays are generally known well in advance, the instructor expects the student to provide at least 7-10 days of advance notice of any upcoming religious observance.

Week	Topics	Homework	Griffiths reading
1 Aug. 22	Currents & Ohm's Law Faraday's Law	1 due 8/31	7.1-7.2
2 Aug. 27	Maxwell's Equations	2 due 9/7	7.3
3 Sept. 3 Labor day	Conservation Laws Poynting Vector	3 due 9/14	8.1-8.2
4 Sept. 10	Electromagnetic waves	4 due 9/21	9.1-9.2
5 Sept. 17	Reflection/Transmission	None	9.3
6 Sept. 24	Absorption	5 due 10/5	9.4
Sept. 24	IN CLASS TEST 1		
Oct. 3	TERM PAPER TOPICS DUE		
7 Oct. 1	Waveguides	6 due 10/12	
7 Oct. 8	Potentials and fields Gauge invariance	7 due 10/19	10.1-10.2
8 Oct. 15	Moving point charges	8 due 10/26	10.3
9 Oct. 22	Dipole radiation	9 due 11/2	11.1
10 Oct. 29	Radiation reaction	None	11.2
11 Nov. 5 Homecoming Nov. 9 Vet's Day Nov. 11	Special Relativity	None	12.1
Nov. 5	IN CLASS TEST 2		
12 Nov. 12	Relativistic Mechanics	10 due 11/14	12.2
13 Nov. 19 Thanksgiving	Relativistic E&M	11 due 11/26	12.3
14 Nov. 26	Special Topic 1: Electrodynamics of superconductors	None	
Nov. 28	TERM PAPERS DUE		
15 Dec. 3	Special Topic 2: Superconductivity applications		
Dec. 14	FINAL 7:30 am-9:30am		