

Syllabus

Phz3113, Introduction to Theoretical Physics

Fall 2008

- **Instructor:**

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

Office Hours: Mon. 7th period, Thurs. 7th (1:55pm). Appointments will gladly be scheduled for those students who cannot make official hours (Note: course T.A. (grader) Yan Wang, NPB1224 will have additional hour Wednesday 1:45-2:45).

- **Text:** M.L. Boas. Mathematical Methods in the Physical Sciences 3rd Edition. John Wiley, 2006.

- **Other Recommended Texts:**

1. Arfken and Weber. Mathematical Methods for Physicists 5th Ed. Harcourt Academic, 2001.
2. R. Shankar. Basic training in mathematics.... Plenum, 1995.
3. D.J. Griffiths. Introduction to Electrodynamics 2nd Edition. Prentice Hall, 1989

- **Course Description:**

Introduction to mathematical tools required for physics, with emphasis on practical uses rather than formal aspects. Where possible, connections of mathematical concepts with fundamental physics examples, particularly electrostatics, statistical physics and thermodynamics will be made.

- **Credits and prerequisites:**

Credits: 3; MAC 2313 and PHY 2061, or permission of instructor.

- **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 all the work for you will interfere with your learning and 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.

There will be two problem sets per week, which will normally be handed out every Wednesday and Friday, and be due the following lecture. Each problem set will be worth a total of 5 points, for 10 points per week, and your grade will decay 2 points for the first day it is late, plus a further point for each subsequent day. I will drop the lowest four homework grades at the end of the course. My goal will be to hand the graded problem sets back the lecture after receiving them, but occasionally other considerations will interfere, and I ask for your understanding.

Tests:

There will be three in-class tests. The lowest absolute score of the 3 tests 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. All necessary paper will be provided, and calculators will not be used extensively.

In-class test 1	NPB 1220, Mon., Sept. 30
In-class test 2	NPB 1220, Wed., Oct. 29
In-class test 3	NPB 1220, Fri., Dec. 5

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 1,2,3 after 1 drop: 50%- Homework: 50% |
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There will be *no* "extra credit" 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, 80-B+, 72-B, 65-C+, 60-C, 55-D+, 50-D. For example, 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. I will give you an estimate of your letter grade after the 2nd test.

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 3113:

- 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, and if possible the lecture notes, 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.

• World Wide 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/phy3113/>. I will in addition post grades and some materials on WebCT, and students can use this facility to post and discuss questions and comments on the course.

Week	Topics	Physics	Boas reading
1	Intro	Gauss law	
2	Infinite Series Asymptotics Line integrals Partial derivatives	Blackbody radiation Thermodynamics	Ch.1 Sec. 6-8 Ch. 4
3	Differentials Max/min. with constraints Differentiating integrals	Thermodynamics	Ch. 4
4	Multiple integrals Vectors, Vector products Vector vs. scalar fields		Ch. 5 Ch. 6
5	Div, grad, curl Stokes' law, divergence theorem		Ch. 6
6	Dirac δ -function Curvilinear coordinates		Sec. 8-11 Sec. 10-8
7	Applications of vector fields	Electrodynamics	Ch. 3
8	Complex numbers Complex functions Analytic functions	RLC circuits	Ch. 2
9	Complex integration Cauchy theorem Laurent series		Ch. 2
10	Linear vector space Linear operators Function spaces	Quantum mechanics	Ch. 3
11	Fourier series Fourier transform Orthogonal functions	Quantum mechanics	Ch. 7
12	Ordinary diff. eqns. Partial diff. eqns.		Ch. 8 Ch. 12,13
13	Wave Eqn. Laplace Eqn. Legendre Polynomials Bessel functions	Waves in elastic media, E & M, ...	Ch. 13