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).


• Other Recommended Texts:

• 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 electrodynamics, 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.

<table>
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<tr>
<th>In-class test 1</th>
<th>NPB 1220, Mon., Sept. 30</th>
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<td>In-class test 2</td>
<td>NPB 1220, Wed., Oct. 29</td>
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<td>In-class test 3</td>
<td>NPB 1220, Fri., Dec. 5</td>
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Grading Policy:
The various components of your final grade will be weighted as follows:

- Tests 1,2,3 after 1 drop: 50%
- Homework: 50%

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.
<table>
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<th>Week</th>
<th>Topics</th>
<th>Physics</th>
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<tr>
<td>1</td>
<td>Intro</td>
<td>Gauss law</td>
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| 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 |