Class Meetings: Unique numbers 60915 and 60920 (MWF 10 - 10:50) RLM 7.104

Instructor: Greg O. Sitz, Office: RLM 10.313, Office Hours: M 12:30-1:30, Tu 4:30-5:30 or by appointment. Phone: 471-0701, email: gositz@physics.utexas.edu

Teaching Assistants: Oscar Chacaltana: oscarch@physics.utexas.edu, TBA

Prerequisites: PHY315, Wave Motion and Optics. If you did make a grade of C or better in 315 please see Dr. Sitz at the end of the first day of class.

Text - Modern Physics from α to Z₀, by Rohlf. We will cover Chapters 1 thru 7 in detail, and some of 8 and 9 as time permits.

Brief Description: This class is an introduction to two topics which underlie much of modern physics: relativity and quantum mechanics. The material will be presented within a historical context but from a contemporary viewpoint. The course has both a classroom and laboratory component, which are intended to compliment each other. The development of the ability to perform more involved experiments and to write up the results in a coherent, complete manner is a primary goal of this class.

Grading - The breakdown is: Homework 15%, In-class exams (best 2 of 3): 25%, Final Exam 25%, Lab Reports 35%. Homework, test scores and lab reports will be weighted as just described and a composite score (S) of between 0 and 100 for the course will be calculated. The final grades for the course will be determined using this composite score as follows: $S \geq 85 \Rightarrow A$; $85 > S \geq 70 \Rightarrow B$; $70 > S \geq 60 \Rightarrow C$; $60 > S \geq 50 \Rightarrow D$; $50 > S \Rightarrow F$. The composite score will not be rounded, that is 84.99 is less than 85.

- **Homework - 15% of grade** - Homework will be assigned approximately weekly during the semester. All homework assignments will be weighted equally (even though they may cover different amounts of material and have different numbers of problems). The lowest score will be dropped in computing the average.

- **In-class Exams - 25%** - Three in-class exams will be given: dates are Feb. 15, Mar. 21 and Apr. 25. The scores from the best two of these three exams will count toward your final grade. Each will be be worth 12.5%.

- **Final Exam - 25%** The final is comprehensive and it is required. It is scheduled for Saturday, May 10 from 7-10 PM.

- **Lab Reports - 35%** A big part of the course.

The exams will be closed book and closed notes. Calculators are allowed. A cover sheet with relevant formulas and constants will be provided. This cover sheet will be available in advance of the exams. Even though only two of the three in-class exams will count toward your semester grade, you are strongly advised to take all three. The final exam will be cumulative, and the best way to prepare for the final is to keep up with the material as it is covered in class. This means being prepared for and taking all the in-class exams.

Unless a substantial illness or family emergency is documented with a note from a physician or the dean’s office, no make-up exams will be given. Any potential absences must be discussed with Dr. Sitz prior to the exam in order to have a make-up. Make-up exams will be oral and taken
within 72 hrs. of the missed exam. Under normal circumstances, a missed exam will simply be your dropped score.

If you are absent from an examination for the observance of a religious holy day you may complete the work missed within a reasonable time after the absence, if proper notice has been given. Notice must be given at least seven days prior to the exam.

**Other:** The last date to drop the course without possible academic penalty is February 11, 2008. The last day to drop the course for academic reasons is March 24, 2008.

Please notify the instructors of any modification/adaptation you may require to accommodate a disability-related need. You will be requested to provide documentation to the Dean of Students' Office, in order that the most appropriate accommodations can be determined. Specialized services are available on campus through Services for Students with Disabilities.

**Alternatives:** This document (as well as other course related material, including homework and test scores) will be available on BlackBoard.

**Syllabus**

Week of January 14: Introduction, electrons, atoms
January 21: Distribution functions, statistical mechanics of ideal gases
January 28: Thermal radiation, Planck’s constant
February 4: Photoelectric effect, Bohr atom
February 11: Finish Chapter 3, Test 1 (on 2/15)
February 18: Special Relativity, transformations
February 25: Energy and momentum
March 3: Applications of Special Relativity
March 10: Mathematics of General Relativity, string theory
March 17: Applications continued, Test 2 (on 3/21)
March 24: Matter waves and the uncertainty principle
March 31: Rutherford scattering
April 7: The Schrödinger wave equation
April 14: One-dimensional problems, barriers
April 21: Harmonic oscillator, Test 3 (on 4/25)
April 28: Time dependent Schrödinger equation

**Quotes**

“You do not know anything until you have practiced” - R. P. Feynman

“90% of success is just showing up” - Woody Hayes

“Anyone who is not shocked by quantum theory has not understood a single word.” - Niels Bohr

“How often have I said to you that when you have eliminated the impossible, whatever remains, however improbable, must be the truth?” - Sherlock Holmes (Sir Arthur Conan Doyle)

“The paradox is only a conflict between reality and your feeling what reality ought to be.” - R. P. Feynman