Introduction to Modern Physics

PHYS 3305 (Fall 2009) Syllabus

http://www.physics.smu.edu/~kehoe/3305_09f

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Texts: "*Modern Physics*", 2nd edition,
Author: Randy Harris
Prerequisite: differential and integral calculus, scientific calculator
Class Coordinates: Tues. & Thurs. 12:30p.m – 1:50p.m. in Rm 155 Fondren Science
Office hours: 2pm-4pm Tuesday, or by appointment

Course Objectives: To provide an overview of the physics of the 20th century. Students will familiarize themselves with special relativity and quantum mechanics. They will also study the physics of nuclei, atoms and semiconductors. Modern applications will be discussed. Problem solving skill development will also be an emphasis of the class.

Method of Instruction: The class will consist of lectures. Homework is the foundation of your effort to acquire skill in using the material in the course. It will be due on each Tuesday following the week the material is covered and will be worth 20% of the course grade. No late homework is accepted. Solutions will be posted on the course website.

Quizzes and Tests: There will be one mid-term exam, and one final exam. The mid-term will make up 20% of the class grade. The final is cumulative over the whole course and counts for 25% of the grade. There will be weekly 15 minute quizzes during the semester, scheduled on Tuesdays of each week. These will provide 20% of your grade. The lowest quiz grade will be dropped. Each quiz covers material since the last test or quiz. Tests and quizzes are closed book. You may bring a single 8.5"x11" sheet with important formulas and constants relevant for the material on each test and quiz. A presentation on a special topic at the end of the semester will count for 15% of the course grade.

Grading and Attendance Policy: In all cases, it is ***crucial*** to show your work to get credit for solutions to physics problems. Regrading requests must be well-justified in writing. Anticipated absences resulting from religious observance or officially sanctioned extracurricular activity must be brought to the instructor's attention at least 2 weeks in advance. Upon request, missed lectures will be recorded as an audio podcast with a copy of lecture notes. Affected quizzes or tests will be given prior to the rest of the class. No other make-up quizzes or tests will be granted.

Physics 3305 Schedule, Fall 2009

Date	Reading, Tests, Quizzes	Homework Problems Assigned:
Aug 27 Th	Ch 1: Precursors to Modern Physics	
Sep 1 T	Ch 2: Special Relativity	Ch 2: 18,20,21,31; 45,51,54,62,70,84,94
Sep 8 T	Ch 2.5+: Relativistic Dynamics HW Ch 2a due; Quiz #1	
Sep 15 T	Ch 3: EM Waves as Particles HW Ch 2b due; Quiz #2	Ch 3: 12,18,19,20,21,26,34,45,49,53
Sep 22 T	Ch 4: Matter Particles as Waves HW Ch 3 due; Quiz #3	Ch 4: 17,18,19,22,24,41,43,48,62,63
Sep 29 T	Ch 5: Schrodinger Equation HW Ch 4 due; Quiz #4	Ch 5: 24,25,28,33,34; 50,60,61,62,78-82
Oct 6 T Oct 8 Th	Ch 5: Bound States HW Ch 5a due; Test #1	
Oct 13 T Oct 15 Th	*Fall Break, no class Ch 5: Particle in a Box	
Oct 20 T	Ch 5: Simple Harmonic Oscillator	
Oct 27 T	Ch 6: Unbound States HW 5b; Quiz #5	Ch 6: 15,16,24,35,45,48,56
Nov 3 T	Ch 6: Potential Barriers	
Nov 10 T	Ch 7: Hydrogen Atom HW Ch 6 due; Quiz #6; *last day to drop	Ch 7: 21,32,36,37,38,44,58,68,85
Nov 13 F	practice talks;	
Nov 17 T	Ch 7: Orbital Angular Momentum	
Nov 24 T	Ch 8: Spin HW Ch 7 due; Quiz #7	Ch 8: 28,30,31,35,41,49,50,56,62,80
Nov 26 Th	*Thanksgiving holiday, no class	
Dec 1 T	Ch 8: Many Electron Atoms Quiz #8	
Dec 3 Th	Ch 10.5-10.8: Semiconductors HW Ch 8 due	Ch 10: 50,57,64,66
Dec 4 F	final presentations	
Dec 8 T	Review Session; HW Ch 10 due	
Dec 17 Th	Final Exam 3pm-6pm	

Learning Objectives for PHYS 3305: (Fall 2009)

Objective #1: Students will acquire the ability to perform basic calculations in special relativity.

Measurements: a) A mid-term and final exam will incorporate problems in relativity to be solved by the student. Because tests are insufficient demonstrations of learning, b) a pre-test and post-test will also be applied at the beginning and ending of the course, respectively.

Objective #2: Students will acquire an ability to understand and utilize simple solutions of the Schrodinger equation of quantum mechanics.

Measurements: a) The final exam will incorporate problems requiring the Schrodinger equation to be solved by the student. In addition, b) a pre-test and post-test will also be applied at the beginning and ending of the course, respectively.

Objective #3: Students will acquire and demonstrate an ability to communicate a technical subject to an inexpert audience.

Measurement: The student will perform a series of preliminary steps leading to the presentation of a modern physics topic by the end of the course. The standards