Physics 240/250: Modern Physics  
Spring 2007  
Course Information and Policies

Contact  
Office : DRL 2N-1—tel. 898-6105----segre@dept.physics.upenn.edu  
Office Hours :will be arranged, but after class is usually the best time to catch me.  

Grading  
Two 1-hour exams , each worth 20%----------40%  
Final-2 hours---------40%  
Homework---------10%  
Laboratory(250 only)------10%  

Lectures  
The lectures will follow the text only very roughly and not in the order they appear there  
so attendance in class is highly desirable. The Tuesday and Thursday classes will be  
lectures on new material, with the possible exception of the two Tuesdays before hour  
exams, where I may decide to have reviews.  

Exams  
Midterm 1 Wed. Feb. 7  
Midterm 2 Wed. March 21  
Final  

There will be no makeup exams. If because of illness or some other reason, you cannot be  
present for an exam, I’ll use your other work to compute your grade. Certification of the  
reason for your absence will be required.  
All exams will be closed book. Please bring a calculator to exams.  
The final exam is scheduled by the Registrar and must be taken at the prescribed time.  
After grading your final exam will be available for you to look at, but not remove.  
I will grade all your exams. If you believe a mistake in grading has been made, write on a  
separate piece of paper your description of the mistake, attach it to the exam and return it  
to me. This must be done within one week of when I have returned the exam to you.  

Homework  
Homework will typically be assigned on Thursday and collected the following Tuesday.  
It will normally be assigned every week. There will probably be a total of 11 homework  
assignments Though it is not as much a part of your grade as the exams, I strongly  
recommend that you do it diligently since you will not learn the material unless you do it.  
I will drop the lowest homework grade of the term. Hand the homework to me on  
Tuesdays- if you cannot attend class, slip it under my door. Do not give it directly to the  
grader. His name is Carl Modes. If you feel your homework has been graded incorrectly,  
please consult him first.
Laboratories
There will be several laboratory sessions in Physics 250, though not every week. Passing the laboratory is a requirement for Physics 250. Anyone who has taken the laboratory previously and wishes to be excused must obtain permission from me prior to the first laboratory meeting. The laboratory sessions are Friday 1-3 and Friday 3-5.

Text
Other texts:
Paul Tipler----Elementary Modern Physics----
J.Bernstein, P. Fishbane and S. Gasiorowicz—Modern Physics
Feynman---Lectures on Physics- particularly vol.3
Historical: A. Pais—Inward Bound

Organization of Material (Preliminary)

Week 1 (Jan.8)----chs.1,2
State of physics in 1900 and discussion of problems that were looming then e.g. X-rays, radioactivity, lifetime of Sun, spectral lines, black-body radiation etc.
Introduction to Special Relativity—length contraction and time dilation

Week 2 (Jan.15)---ch 2,
Continuation of Special Relativity
Twin Paradox, Doppler Effect and simultaneity
Lorentz transformations
Energy and Momentum

Week 3 (Jan. 22 ) ---chs. 3,4
Introduction of quantum theory
Black body radiation, specific heats
Photo-Electric Effect
Rutherford’s discovery of atomic nucleus
Bohr atom—hydrogen, helium ion---elliptical orbits

Week 4 (Jan.29)  ch. 5
De Broglie suggestion of electrons as waves
Existence of the photon—Compton scattering
Wave-Particle duality
Heisenberg Uncertainty principle

Week 5 (Feb. 5)
Tuesday--Review
hour exam on Wed. Feb. 7 (chs. 1,2,3,4,5)
Thursday-- Schrodinger equation in 1 dimension

**Week 6 (Feb. 12 ) ch.6**
Schrodinger equation in 2,3 dimension
Barrier penetration
Quantum mechanics in spherical coordinates
Hydrogen atom

**Week 7 (Feb. 19) ch.7**
Quantum mechanics of H atom continued
Electron spin
Pauli principle

**Week 8 (Feb.26) ch.8**
Atoms
Angular momentum
Periodic Table

**Week 9 ( Spring Break)**

**Week 10 ( March 12) ch.10**
Molecules
Bonding
Solids

**Week 11 (March 19)**
Tuesday--Review
hour exam on Wed. March 21 (chs. 6,7,8,9)
Thursday---Conductors, insulators and semiconductors

**Week 12 (March 26) ch.12**
Nuclear stability
Nuclear decay

**Week 13 (April 2) ch.14**
Elementary particles
Quarks, neutrinos, gluons

**Week 14 (April 9) ch.15**
General Relativity
Gravitational Waves
Black Holes

**Week 15 (April 16) ch.16**
Cosmology
Hubble’s Law
Expansion of universe
The Big Bang

Final Exam----Half on chs. 10,12,14,15,16 and half on course as whole