

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

Contact

Office : DRL 2N-1—tel. [898-6105](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

Stephen Thornton and Andrew Rex—Modern Physics----Thomson-Brooks Cole publishers 2006

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