

Physics 32100 G

Modern Physics for Engineers and Scientists

Spring 2008

Instructor: Prof. Hernan A. Makse, T1M-12, hmakse@levdec.engr.ccnycunycuny.edu, 212-650-6845, <http://www-levich.engr.ccnycunycuny.edu/~hmakse/TEACHING/teaching.html>
Class schedule: M W 5-6:15 PM in MR3
Office hours: M (3:00-4:00 PM) and W (3:00-4:00 PM) in Levich Institute, T1M-12
Textbook: *Modern Physics for Scientists and Engineers*, 2nd Edition by J.R. Taylor, C.D. Zafiratos, and M.A. Dubson
Prerequisites: Physics 20800 and Math 39100 (Differential Equations)
TA office hours: TBA

Syllabus:

Date:	Reading assignment	Homework
Jan. 28(M)	1(1-6) Einstein's theory of relativity	1(4,6,9)
Jan. 30(W)	1(7-10) time dilation, length contraction	1(23,26,29,31,33)
Feb 4(M)	1(11-14); 2(1-3) Lorentz transformation; relativistic mechanics	1(39,45,46,49); 2(1)
6(W)	2(5-10) relativistic energy, $E = mc^2$, mass \leftrightarrow energy, massless particles, general relativity	2(9,17,19,22,24,27,31,37,38)
11(M)	3(1-5,10-12) atomic parameters, nuclear atom	3(2,12,47)
13(W)	4(1-3) 4(1,4,5,12,14,17) quantization of light, photoelectric effect; <u>simultaneity tutorial</u>	
18(M)	college closed	
20(W)	4(4-7); 5(1-4) x-rays, particle-wave duality; quantization of energy levels	4(22), 5(1,3,6)
25(M)	5(5-7) Bohr model of H atom	5(10a-b,12,15,23)
27(W)	5(8-9); 6(1-4) matter waves, quantum wave function	6(3,6,8,15)
March 3(M)	6(5-9) wave packets, uncertainty relations	6(21,28,30,37,39)
5(W)	7(1-4) Schrödinger equation, particle in a box (quantum well)	6(42,45,48); 7(12,17,18,21)
10(M)	Schrödinger equation	
12(W)	7(5-6) particle in a box contiued	7(24,30)
17(M)	Exam 1 (1-6)	
19(W)	7(7-10) the free particle, non-rigid box, simple harmonic oscillator	7(36,39,52)

March	24(M)	College closed
March	26(W)	8(1-3) 7(55), 8(4,10,12) tunneling; two-dimensional square box (quantum wire)
	31(M)	8(5-7) 8(21,24) central forces, quantization of L , H atom again
April	2(W)	8(8-10); 9(1-2) 8(40,42,48) H atom wave functions; electron spin
	7(M)	9(3-6); spintronics 9(5,11,19) magnetic moments, Zeeman effects
	9(W)	10(1,4-8); 11(1,6) 10(7,18) Pauli exclusion principle, periodic table, atomic transitions
	14(M)	<u>review; problem solving</u>
	16(W)	Exam 2 (Chapts. 7-10)
	21-23	Spring break
	28(M)	11(7-9); 13(1) Chapt. 11 handout sheet lasers; introduction to physics of solids
	30(W)	13(2-3) 13(6,7,15,20a-b) bonding in solids, order and disorder
May	5(M)	13(4-5); 14(1-2) 13(25,33); 14(3,7,11) energy bands, conductors; semiconductors
	7(W)	16(1-3,7); 17(1,2) 16(1,9,13,17,32) atomic nuclei, nuclear force, binding energy; radioactivity
	12(M)	17(3-8) 17(1,7,12,15,27,36,42,47,53) nuclear reactions, nuclear fission and fusion
	14(W)	<u>review; problem solving. Last day of classes</u>
	19-24	Final Exams

Important Information for Physics 32100 students:

Course Objectives: Students will be expected to understand the physical principles involved in several important areas of “modern physics” that are employed today in science and engineering. These include Einstein’s theory of relativity and the quantum mechanical behavior of particles and atoms, of light, and of solids and nuclei. The emphasis will be on fundamental principles as well as on practical applications such as quantum wells, wires and dots, lasers.

Reading assignment: This is the text material that will be covered in class each day. You should read the indicated material in the textbook before coming to class.

Homework: The homework is optional and it will not be collected in class. However, it is strongly recommended to do all the homework material.

Grades: Student performance will be based on the following components:

1 st midterm	25%
2 nd midterm	25%
Final exam	50%

Exams: There will be two midterm exams (75 min.) and a final exam (140 min.). The final exam will include all the material covered in the semester. No exam grades will be dropped and no make-ups will be given except in the case of documented illness.

Extra help: Students can obtain extra help in this course by meeting with me either during my office hours or at other mutually agreeable times. Homework problems will be discussed during with the Teaching Assistant office hours (TBA).