Modern Physics Spring 2009

Text: Modern Physics, Thornton & Rex

Joseph L. Powlette, CHS 110, 861-1438
Powlette@cs.moravian.edu office hours posted

Lecture #	Section	Topic	Problems	Labs
Week of Jan 19				
1	1.1-1.6	Introduction		
2	2.1	Galilean xform	Handout (H)	Michelson
3	2.2	M & M expt	6, 7	Interferometer
4	2.3-2.4	Lorentz xform	13, 16	
Week of Jan 26				
5	2.5-2.6	Length, time, velocity	20, 30	γ absorption
6	2.10	Doppler effect	32,35,48,51	
7	2.11	Relativistic momentum	57	
Week of Feb 2				
8	Not in text	Particles in B fields	56, 61	Relativity via
9	Exam 1			Compton edge
10	2.11-2.13	Kinetic energy	67,70,73	
11	2.13-2.14	Relativistic invariance	81	
Week of Feb 9				
12	continue above		H, H	Photoelectric
13	continue above		H, H, H	effect
14	3.4, 3.5		17, 24	
15	3.6	Photoelectric effect	33, 39	
Week of Feb 16				
16	3.8	Compton effect	47, 58	Compton effect
17	3.7, 5.1	x-rays, Bragg's law	41, 43	
18	not in text	Miller indices	H, H	
19	not in text	Crystal structure factor	H	
Week of Feb 23				
20	3.9	Pair production	54, 55, H	x-ray diffraction
21	3.1, 3.2	e/m and e	4, 7, 8	
22	3.5	Blackbody radiation	17, 18	
23	4.1-4.2	Rutherford scattering	6, H	
Week of Mar 9				
24		continue above	H, H	Blackbody
25	4.3-4.5	Bohr atom	24, 31, 33	Spectrum
26	4.6-4.7	Emission & absorption	35, 50	
27	4.5	Reduced mass	53	
Week of Mar 16				
28	4.6-4.7	Moseley's law	38, 40,447	Moseley's
29	not in text	Old quantum mechanics	H	law
30	continue above		H	
31	5.2	DeBroglie	6, 12, 15	
Week of Mar 23				
32	Exam 2			
33	5.3	Davisson-Germer expt	20	electron
34		Complementarity	H	diffraction
			or One Photon at a Time Experiment	

Week of Mar 30				
35	5.4-5.6	Wave packets	27, 28, 32	Franck- Hertz
36	5.7	Uncertainty principle	37, 43, 59	
37	continue above		H	
38	continue above			
Week of Apr 6				
39	6.1	Schrödinger's equation	5, 8	Mass of neutron
40	6.2	Wave functions	11	
41	6.3, 6.4	Infinite square well	19, 21	
42	7.1, 7.2	Hydrogen atom in 3D	9, 11	
Week of Apr 13				
43	7.3	Angular momentum	21, 24, 30	EPR
44	7.4, 7.5	Magnetic moment in B field	44, H	NMR
45	8.2, 8.3	Spin & anomalous Zeeman	12, 34, 37	
April 20				
46	14.1-14.4	Elementary particles	8, 14	Zeeman effect
47	14.5	continue above	11, 17, 43	or
48	14.5	Quarks	20	Muon Lifetime
Week of Apr 27				
49	Exam 3			
50	12.1-12.4	Nuclear properties	2, 22	coincidence
51	12.7	$\alpha,\beta\ \gamma$ decay	35, 39	counting
52	12.3-12.5	Binding energy	15, 20	

Grades will be determined by 25% problem solutions, 25% exams, 25% laboratory (with contributions from WAC) and 25% final exam.

Problem solutions are to be your own work and cooperation with other students is not permitted and will be considered cheating. Help with problems is only available from the instructor.

Writing across the Curriculum (WAC)
Physics and Earth Sciences Department

The department of Physics and Earth Sciences has identified the course in **Modern Physics 222** as the course to satisfy the requirement for the writing across the curriculum.

The writing component of his course will consist of:

1. Laboratory reports which will not only describe the objectives of the experiments, but also explore the historical aspects of the experiment and physical concepts.
   a. The reports are expected to be written in good English with emphasis on clear and concise explanations that could be understandable to students of the same educational level as the writer.
   b. The reports are to be written with a word processor and equations are to be written with an equation editor.
   c. Diagrams are to be included using a drawing editor.

2. The lecture component will have at least one major paper designed to explain a chosen physical concept at a level understandable to a student of similar educational background.
3. Approximately 25% of the student's grade will come from the writing component of the course.