

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF PHYSICS**

PHYS 212 – Modern Physics
First Semester 2006-2007 (061)

Course Schedule, Syllabus and Grading Policy

Instructor : Prof. Dr. Fida F. Al-Adel,

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COURSE DESCRIPTION :

An introductory course in Modern Physics. Topic covered include:

- Special Theory of relativity; Electromagnetic Radiation; The Nuclear Atom; Bohr's Theory of the atoms; The wave Nature of Matter; Quantum Mechanics in one and three Dimensions; Atomic X-ray Spectra; Selected topics in Atomic, Nuclear and Solid State Physics

PRE-REQUISITIE: PHYS 102 and Math 102.

TEXTBOOK: Modern Physics, by R. A. Serway et al. Second Edition, Saunders College Publishing 1997.

References: 1-) A. Baiser Concepts of Modern Physics, McGraw-Hill, NY (1981) call# QC 173. B413.

2-) R. T. Winder and R. L. Sells , Elementary Modern Physics. Sec. Ed., Allyn and Bacon Inc. Boston (1980) call# QC23.W4

5. GOALS: To introduce the students to the basic concepts of the major Physics theories of the 20th century, namely the special theory of relativity and quantum mechanics and to discuss some selected topics in atomic, solid state, nuclear and particle physics.

4. GRADING POLICY

Class and homework	20 %
First Major Exam (Ch. 1-3)	15 %
Second Major Exam (Ch 4-7)	15 %
Final Exam (Comprehensive)	30 %
Laboratory	20%

- As per KFUPM Policy, DN will be assigned for 9 unexcused absences or 3 absences in laboratory experiments

Physics 212 Lecture Schedule - Spring 2005 (Term 042)

Week	Date	Topics	Chap.	Sect.
1	St 9 Spt	Overview; The Principle of Relativity	1	1, 2
	11	The Michelson-Morley experiment	1	3
	13	Postulates of Special Relativity and Its Consequences	1	4, 5
2	Norm. St	Applet		
	14 Spt	The Lorentz Transformation	1	5, 6
	16	Relativistic Momentum and Newton's Laws	1	7
	18	Relativistic Mechanics	1	8-10
19 Sept. - Last day for dropping courses without permanent record				
3	20 Sept.	Applet Electromagnetic Waves	2	1, 2
	25	Applet Blackbody radiation	2	2, 3
	27.	Plank's Law and Rayleigh-Jeans Law Applet1 , Applet2	2	3, 4
4	St 30 Spt	Applet The Photoelectric Effect	2	4,5
	02 Oct.	The Compton Effect and Particle Wave Complementarity	2	5
	04 Oct.	Atoms and Electrons – The Rutherford Model Applet1 , Applet2 , Applet3 , Applet4	3	1, 2
5	St 07 Oct	The Bohr Atom Applet1 , Applet2 , Applet3	3	2, 3
	09 Oct	Franck-Hertz Experiment	3	3-5
	10 Oct	FIRST MAJOR EXAM		
	11	De Broglie Waves and Davisson-Germer Experiment	4	1,2
6	28 Oct	Applet1 , Applet2 Phase Velocity and Group Velocity of Waves	4	3
	30	The Heisenberg Uncertainty Principle	4	5
	1Nov.	Particle-Wave Duality of the Electron	4	6, 7
7	St 4 Nov M	Review Applet1 , Applet2	applet	
	06	The Born Probabilistic Interpretation	5	1, 2
	08	The Schrodinger Equation for Particles	5	3, 4
8	11 Nov	Applet The Particle in a Box (One dimension)	applet	4
	13	The Finite square well	5	5
	16	Applet The Quantum Oscillator	applet	6
9	18 Nov	Operators and Observables in Quantum Mechanics	5	7, 8
	20	Tunneling Phenomena	6	1
	22	Applications	6	2
10	25 Nov	Particle in a Box (Three Dimensions)	7	1
	27	Angular Momentum	7	2
	29	Space Quantization	7	3
11	2 Dec.	Hydrogen-like Atoms, Selection Rules	7	4, 5
	04	Orbital magnetism, Zeeman Effect, Electron Spin	8	1, 2
	06	The Spin-Orbit Interaction	8	3
12	09 Dec	Review		
	11	The Exclusion Principle, Electron Interaction	8	4, 5
	13	The Periodic Table	8	6
13	16 Dec	X-ray Spectra	8	7
	18	Bonding Mechanisms Molecular Rotation and Vibration,	10	1, 2
	20	Molecular Spectra	10	3
14	6 Jan	Bonding in Solids	11	1
	08	Free-Electron Model of Metals	11	2
	10	Quantum Theory of Metals	11	3
15	13 Jan	Lasers		
	15	Review		
	17	Review		