The Hashemite University

Faculty of Science

Physics Department

Course Description

Department: Physics	
Year: 2012/2013	**Semester**: Summer

Course Information

Course Title	**Modern Physcis**
Course No.	0102261
Course Credits	Three Credits Hours
Prerequisite	General Physics 102102
Course Duration	8-weeks

Instructor: **Dr. Feras Afaneh**

Office: Physics Department Building, Room 206

Textbook	
Title	Concepts of Modern Physics
Authors	Arthur Beiser
Publisher	McGraw Hill
Year	1995
Edition	5th edition

Reference Books

1. **"Modern Physic**s" by K. Krane, Second Ed., John Wiley and Sons Inc., 1996.
2. **"Modern Physic**s" by H. Ohanian, Second Ed., Prentice Hall, 1995.
3. **"Quantum physics of atoms, molecules, solids, Nuclei and particle**s", by R.Eisberg & R.Resnick, 2 nd edition(1985).

Evaluation Policy		
Assessment Type	Expected Date	Weight
First Exam	November 2006	20%
Second Exam	December 2006	20%
Assignments		10%
Final Exam	To be annouced	50%

Course Objectives:

1.	To be familiar with basic concepts of special relativity, their origin and their wider implications in physics.
2.	To be aware of the limitations of classical physics, the origin of modern physics and the experimental evidence that led to its birth.
3.	To demonstrate and solve selected problems, which develop, needed analytical skills.
4.	To enhance the ability of the student for self-learning.

Course Outline

Chapter 1: Special Relativiy:
Time delation, Doppler effect, length contraction, twin paradox, electricity and magnetism, relativity of mass, mass and energy, massless particles.

Chapter 2 : Particle Properties of Waves:
Electromagnetic waves, blackbody radiation, photoelectric effect, X-rays, X-ray diffraction, Compton effect, pair production.

Chapter 3: Wave properties of Particles:
De Broglie waves, describing a wave, phase and group velocities, particle diffraction, particle in a box, uncertainty principle, applying the uncertainty principle

Chapter 4: Atomic Structure:
The nuclear atom, electron orbits, atomic spectra, Bohr atom, energy levels and spectra, correspondence principle, nuclear motion, atomic excitation, the laser.

Chapter 5: Quantum Mechanics::
Wave equation, Schrodinger Equation, expectation values, Schrodinger equation: steady-state form, particle in a box, finite potential well, tunnel effect, harmonic oscillator.