

## Level Four

### Modern Physics

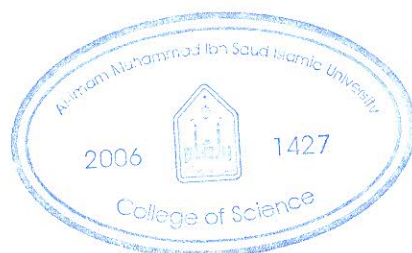
Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
PHY	250	Modern Physics	3	3	0	1	MAT 102, PHY 105

#### *Objectives:*

This course is an introductory to Modern Physics. It introduces science students to the foundations and principles of modern physics and their applications. The basic objective of this course is to familiarize the students with the concepts, theories and models behind many applications of our present technological society. It is an essential step in the education of a modern scientist.

#### *Syllabus:*

List of Topics	No. of Weeks	Contact Hours
<b>Relativity:</b> Einstein's principle of special relativity, consequences of special relativity, the Lorentz transformation equations, relativistic momentum and the relativistic form of Newton's laws, relativistic energy, equivalence of mass and energy.	3	12
<b>The Quantum Theory of Light:</b> Particle properties of waves, blackbody radiation and Planck's hypothesis, the photoelectric effect, explanation of the photoelectric effect, the x-rays and some applications, the Compton effect, pair production.	3	12
<b>Introduction to Quantum Physics:</b> Photons and electromagnetic waves, wave properties of particles, De Broglie waves, matter waves, the electron microscope, the uncertainty principle.	2	8
<b>Atomic Structure:</b> the particle nature of matter, early models of the atom, Bohr's quantum model of the hydrogen atom, atomic spectra and transitions, nuclear effects on spectral lines, the Franck-Hertz experiment.	2	8
<b>Molecular Structure:</b> Molecular bonding, energy states and spectra, molecular vibration and rotation, electronic transitions in molecules.	2	8
<b>Nuclear Structure:</b> Nuclear composition, some properties of nuclei, binding energy, radioactivity.	2	8



**References:**

- Physics for Scientists and Engineers (with modern physics) –by Raymond A. Serway, and John W. Jewett – Brooks Cole – 6<sup>th</sup> Edition (July 21, 2003)
- Randall D. Knight, physics for scientists and engineers with modern physics, (December, 2003)

