



Introduction to Modern Physics

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab	Tut	Prerequisites
PHY	255	Introduction to Modern Physics	2	2	0	0	PHY 101

Objectives:

Students will develop an understanding of some of the fundamental laws of nature and their mathematical representation. They will extend their understanding of macroscopic phenomena to include the geometric optics, physical optics and mechanical waves. This understanding will extend beyond a theoretical development of ideas to include some practical application. Furthermore, some concepts of lasers and what are the differences between an ordinary light and extra-ordinary light as well as atomic spectra.

Syllabus:

Laws of Geometrical Optics and Image Formation: reflection, refraction, dispersion and prisms, total internal reflection, images formed by flat mirrors, images formed by spherical mirrors, images formed by refraction, thin lenses.

Laser: Introduction, Bohr's model of the hydrogen atom, Absorption, emission, spectra (series) Lyman, Balmer... etc.

Properties of Laser: Ordinary Vs extraordinary light, Maxwell, Boltzmann distribution Beer's law, Non-inverting condition ; thermal equilibrium, inversion, Einstein's coefficients.

Laser amplification and oscillation: Hypothetical laser amplifier, population inversion technique.

Introduction to spectroscopy: Vibrational and rotational spectra, atomic emission spectroscopy.

Textbook:

Hecht E. Optics, 4th edition, Addison-Wesley, 2004.

References:

Jenkins F.A., White H.E. Fundamentals of Optics, 4th edition, McGraw-Hill, 2001.

