



PHY 240 – Waves & Optics

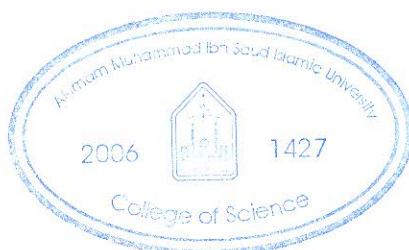
| Course Code | Course Num. | Course Name | Credit Hours | Lec | Lab | Tut | Prerequisites |
|-------------|-------------|----------------|--------------|-----|-----|-----|-------------------|
| PHY | 240 | Waves & Optics | 3 | 3 | 0 | 1 | PHY 105 – MAT 102 |

Learning 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 optic, physical optic and mechanical waves. This understanding will extend beyond a theoretical development of ideas to include practical application.

Syllabus (56 Hours)

- **The laws of geometric optics and image formation (12 H)**
Reflection, Refraction, Dispersion and Prism, Total internal reflection, Images formed by flat mirror, Images formed by spherical mirrors, Images formed by refraction, Thin lenses
- **Interference of light waves (10 H)**
Conditions for interference, Young's double-slit experiment, Intensity distribution of the double-slit interference pattern, Change of phase due to reflection, Interference in thin films.
- **Diffraction Patterns and Polarization (10 H)**
Introduction to diffraction patterns, Diffraction patterns from narrow slits, Resolution of single-slit and circular apertures, The diffraction grating, Polarization of light waves.
- **Wave Motion (8 H)**
Propagation of a Disturbance, Sinusoidal Waves, The Speed of Waves on Strings, Reflection and Transmission, Rate of Energy Transfer by Sinusoidal Waves on Strings, The Linear Wave Equation
- **Sound Waves (8)**



Speed of Sound Waves, Periodic Sound Waves, Intensity of Periodic Sound Waves, The Doppler Effect

- **Superposition and standing waves (8 H)**

Superposition and Interference, Standing Waves, Standing Waves in a String Fixed at Both Ends, Resonance, Standing Waves in Air Columns, Standing Waves in Rods and Membranes.

Reference Books:

- Optics, by Eugene Hecht, 4th Edition (2001)
- Physics for Scientists and Engineers (with modern physics) –by Raymond A. Serway, and John W. Jewett – Brooks Cole – 6th Edition (July 21, 2003)
- Randall D. Knight, physics for scientists and engineers with modern physics, (December, 2003)

