# Physics 2(WAVES AND OSCILLATIONS)

## PRE-REQUISITE: FSc Level Physics

## CREDITE HOURS: 3

This course is one part of four that constitute the Introductory Physics program for Physics Majors. It is a stepping stone to all the upper-level Physics courses providing fundamental knowledge, mathematical techniques and laboratory practices. Many of the concepts in Waves, Optics and Thermodynamics introduced in this course will be encountered again & expanded upon in later courses.

## COURSE OBJECTIVE:

Thus the main objective of this course is to provide students an introduction to the fundamental concepts of Waves, Optics, and Thermodynamics along with a thorough grounding in the associated mathematical and laboratory techniques.

1. Describe wave motion, including differentiating between transverse vs longitudinal waves, and standing vs progressive waves.
2. Derive and solve the equation for a propagating wave and a standing wave.
3. Describe the energy transported by a wave and the resonance condition,
4. Explain Huygen's Principle and perform calculations involving the Doppler effect.
5. Perform calculations related to the concept of superposition, including interference & diffraction.

## COURSE OUTLINE:

**Simple and Damped Simple Harmonic Oscillation:** Mass-Spring System, Simple Harmonic Oscillator Equation, Simple Pendulum. Forced Damped Harmonic Oscillation, Resonance.

**Mechanical waves:** traveling waves, wave equation and power and intensity in wave motion, principle of superposition, Doppler Effect of sound waves

**Interference:** Interference from thin films, Michelson interferometer, Fresnel’s biprism and its use,

**Diffraction:** diffraction from multiple slits, diffraction grating, X-ray diffraction and structure of matter,

**Polarization:** description of polarization states, rotation of plane of polarization, holography.

**Evaluation Criteria**

| Examination | Type | Marks |
|---|---|---|
| Internal Examination | Sessional Work | 15% |
| | Mid-Semester | 25% |
| External Examination | Final Semester | 60% |

**REFERENCE BOOKS:**


1. Physics Vol. I & II (extended) by Resnick, Halliday and Krane, 4th Edition, John Wiley and Sons Inc, New York, 1992.
2. Physics Vol. I & II by Resnick, Halliday and Krane, 5th Edition, John Wiley and Sons Inc, New York, 2002.
3. Fundamental of Physics by Halliday Resnick and Krane, 5th Edition, John Wiley and Sons Inc, New York, 1999.
4. University Physics 8th Edition by Sears, Zemansky and Young, Addison-Wesley, Reading (MA), USA, 2000.
5. Physics by Alonso and Finn: Addison-Wesley, Reading (MA), USA, 1999.