

Course Title	Course Code	Number of Study Hours			Year	Level	Prerequisites
		Theoretical	Laboratory	Credit			
Waves & Vibrations	212PHYS	2	---	2	2 nd	4 th	251PHYS

(1) **Brief Course Description**

The course provides fundamental concepts of vibrations and waves including oscillatory motion, wave motion, sound waves, and superposition of standing waves.

(2) **Course Objectives**

The course is designed to provide students with:

- The physics of systems move in simple harmonic motion (SHM).
- Velocity, acceleration, and kinetic, potential, and mechanical energies of SHM systems.
- Damped oscillations.
- Wave motion and sound waves.
- Waves Interference
- Superposition of standing waves.

(3) **Course Contents**

- **Simple harmonic motion:** Simple harmonic motion, The block–spring system, linear velocity of a particle undergoing simple harmonic motion, frequency and periodic time, energy function of the simple harmonic oscillator, The simple pendulum, the physical pendulum, the torsional pendulum, comparing simple harmonic motion with uniform circular motion.
- **Damped and forced oscillation:** underdamped, critically damped, overdamped oscillations, and forced oscillation.
- **Wave Motion:** basic variables of wave motion, travelling waves, transverse wave, longitudinal waves, superposition and interference, the speed of waves in a string, sinusoidal waves, rate of energy transfer in a sinusoidal wave, the linear wave equation.
- **Sound Waves:** speed of sound waves, the relationship between wave speed and medium temperature, periodic sound waves and their intensities, sound level, the Doppler Effect.
- **Superposition and Standing Waves:** superposition and interference of sinusoidal waves, interference of sound waves, standing Waves, standing waves in a string fixed at both ends, and resonance.

(4) **Assessment Criteria**

- Periodic Exams: 40%
- Oral, Student Activity and Essay: 10%
- Final Exam: 50%

(5) **Course Teaching Strategies**

- Lectures, Reports and Essay Assignments, Homework, and Web-based Assignments

(6) **Text Book**

- Vibrations and Waves (The M.I.T. Introductory Physics Series), A. P. French, W. W. Norton & Company; 1 edition (January 17, 1971).

(7) **Reference Books**

- Physics for Scientists and Engineers, Raymond A. Serway, John W. Jewett, 5th Edition, 2000.
- Fundamentals of Physics; Halliday, Resnik and Walker, John Wiley and Sons Inc., 2007.