

University Physics I

Class

PHYS 2425

Fundamental principles of physics, using calculus, for science, computer science, and engineering majors; the principles and applications of classical mechanics, including harmonic motion, physical systems and thermodynamics; and emphasis on problem solving.

Basic laboratory experiments supporting theoretical principles presented in PHYS 2425 involving the principles of applications of classical mechanics, including harmonic motion and physical systems; experimental design, data collection and analysis, and preparation of laboratory reports.

A course for engineering and science majors. The major topics covered are, mechanics, wave motion and heat. Three hours lecture and three hours lab per week

Course Learning Objectives

When this course is completed, the student will have learned:

- a. How to solve basic vector equation using the concepts of, vector addition (geometrically and components), unit vectors, cross products, dot products.
- b. How to mathematically describing and analyze kinematic motion in one, two, and three dimensions using the concepts of displacement, average/instantaneous velocity, average/instantaneous acceleration, projectile motion, uniform circular motion, and relative motion.
- c. How to identify categorize the various macroscopic forces.
- d. How to mathematically describe and analyze the effects of macroscopic forces on an object using Newton's three Laws of Motion and Newton's Law of Universal Gravitation. This will include the effects of mass, macroscopic forces, including long range and contact forces.
- e. How to use the concept of energy and work to solve various physical problems, including the general concept of energy, kinetic energy, and potential energy, mechanical energy.
- f. How and when to apply the concept of conservation of energy to analyze and solve various physical situations. This will include relationship between work and potential energy, path independence conservative forces, conservation of mechanical energy, work done by external forces.
- g. How to apply the fundamental concepts of linear momentum including Impulse-Momentum Theorem, conservation of momentum, motion of the center of mass, elastic and inelastic collisions and systems with varying mass in one and two dimensions.
- h. How to apply the concepts of rotational kinetic energy, rotational inertia, rotational equilibrium, angular momentum and torque to describe and analyze rotation of a rigid body.
- i. How to apply the concepts of pressure, Pascal's Principle, the effect of gravity, on fluid pressure, buoyant forces, flow, Bernoulli's Equation, viscosity, drag and surface tension to describe and analyze behavior of fluids
- j. How to apply the concepts and mathematical properties of waves to various waves including waves on a string, energy, power in a traveling wave, principle of superposition, interference, standing waves, resonance waves to various physical situation.
- k. How to apply the concepts of temperature and its effect on, thermal equilibrium, thermal expansion of solids and liquids, absolute temperature, Ideal gas law, kinetic theory of the ideal gas, reaction rates, and diffusion.
- l. How to apply and analyze basic concepts of thermal dynamics including, The First Law of Thermodynamics, thermodynamic processes for an ideal gas, reversible and irreversible process, heat engines, entropy, and The Third law of Thermodynamics

Required Textbooks

Matter and Interactions 4th edition by Chabay and Sherwood

Lab Text

None. Lab handouts will be provided

Disabilities

ADA Statement:

Any student with a documented disability (e.g. learning, psychiatric, vision, hearing, etc.) may contact the Office on the Weatherford College Weatherford Campus to request reasonable accommodations. *Phone:* 817-598-6350
Office Location: Office Number 118 in the Student Services Building, upper floor. *Physical Address:* Weatherford College 225 College Park Drive Weatherford, TX.

Academic Integrity

Academic Integrity is fundamental to the educational mission of Weatherford College, and the College expects its students to maintain high standards of personal and scholarly conduct. Academic dishonesty of any kind will not be tolerated. Academic dishonesty includes, but is not limited to, cheating on an examination or other academic work, plagiarism, collusion, and the abuse of resource materials including unauthorized use of Generative AI. Departments may adopt discipline specific guidelines on Generative AI usage approved by the instructional dean. Any student who is demonstrated to have engaged in any of these activities will be subject to immediate disciplinary action in accordance with institutional procedures.

Lab Fee

\$24.00