

Course Objectives/Course Outline
Spokane Community College

Course Title: General Physics

Prefix and Course Number: PHYS 101

Course Learning Outcomes:

By the end of this course, a student should be able to:

- Explain physics principles and state pertinent facts pertaining to Newtonian mechanics, focusing on motion, forces, energy, momentum, oscillations, rotations and fluids.
- Solve problems using physics principles and facts
- Recognize how physics applies to related areas
- Perform laboratory experiments, record observations, gather and analyze data, and present the results in written form.

Course Outline:

- I. Introduction and Mathematical Concepts
 - A. The nature of Physics.
 - B. Units
 - C. The role of Units in Problem Solving.
 - D. Trigonometry.
 - E. Scalars and Vectors.
 - F. Vector Additions and Subtractions.
 - G. The Components of a Vector.
 - H. Vector addition by Component Method.
- II. Kinematics in one dimension
 - A. Displacement.
 - B. Speed and Velocity.
 - C. Acceleration.
 - D. Equation of Kinematics for Constant Acceleration.
 - E. Applications of the Equation of Kinematics.
 - F. Freely Falling Bodies.
 - G. Graphical Analysis of Velocity and Acceleration.
- III. Kinematics in Two Dimensions
 - A. Displacement, Velocity and Acceleration
 - B. Equations of Kinematics in Two Dimensions
 - C. Projectile Motion
 - D. Relative Velocity
 - E. Concepts and Calculations.
- IV. Forces and Newton's Laws of Motion
 - A. The concepts of Force and Mass
 - B. Newton's First Law of Motion
 - C. Newton's Second Law of Motion
 - D. The Vector Nature of Newton's Second Law of Motion
 - E. Newton's Third Law of Motion
 - F. Types of Forces: An Overview
 - G. The gravitational Force
 - H. The Normal Force
 - I. Static and Kinetic Frictional Forces
 - J. The Tension Force
 - K. Equilibrium Applications of Newton's Laws of Motion

- L. Concepts & Calculations
- V. Dynamics of Uniform Circular Motion
 - A. Uniform Circular Motion
 - B. Centripetal Acceleration
 - C. Centripetal Force
 - D. Banked Curves
 - E. Satellites in Circular Orbits
 - F. Apparent Weightless and Artificial Gravity
 - G. Vertical Circular Motion
 - H. Concepts and Calculations.
- VI. Work and Energy
 - A. Work Done by a Constant Force
 - B. The Work-Energy Theorem and Kinetic Energy
 - C. Gravitational Potential Energy
 - D. Conservative Versus Nonconservative Forces
 - E. The Conservation of Mechanical Energy
 - F. Nonconservative Forces and the Work-energy Theorem
 - G. Power
 - H. Other Forms of Energy and Conservation of Energy
 - I. Work Done by a Variable Force
 - J. Concepts and Calculations
- VII. Impulse and Momentum
 - A. The Impulse – Momentum Theorem
 - B. The Principle of Conservation of Linear Momentum
 - C. Collisions in One Dimension
 - D. Collisions in Two Dimensions
 - E. Center of Mass
 - F. Concepts and Calculations
- VIII. Rotational Kinematics
 - A. Rotational Motion and Angular Displacement
 - B. Angular Velocity and Angular Acceleration
 - C. The Equations of Rotational Kinematics
 - D. Angular Variables and Tangential Variables
 - E. Centripetal Acceleration and Tangential Acceleration
 - F. Rolling Motion
 - G. The Vector Nature of Angular Variables
 - H. Concepts and Calculations
- IX. Rotational Dynamics
 - A. The Action of Forces and Torques on Rigid Objects
 - B. Rigid Objects in Equilibrium
 - C. Center of Gravity
 - D. Newton's Second Law for Rotational Motion About a Fixed Axis
 - E. Rotational Work and Energy
 - F. Angular Momentum
 - G. Concepts and Calculations
- X. Simple Harmonic Motion and Elasticity
 - A. The Ideal Spring and Simple Harmonic Motion
 - B. Simple Harmonic Motion and the Reference Circle
 - C. Energy and Simple Harmonic Motion
 - D. The Pendulum
 - E. Damped Harmonic Motion
 - F. Driven Harmonic Motion and Resonance

- G. Elastic Deformation
- H. Stress, Strain, and Hooke's Law
- I. Concepts and Calculations

XI.

Fluid

- A. Mass Density
- B. Pressure
- C. Pressure and Depth in a Static Fluid
- D. Pressure Gauge
- E. Pascal's Principle
- F. Archimedes' Principle
- G. Fluids in Motion
- H. The Equation of Continuity
- I. Bernoulli's Equation
- J. Applications of Bernoulli's Equation
- K. Viscous Flow
- L. Concepts and Calculations