

Spokane Community College
Course Learning Outcomes and Outline

Course Title: Introductory Physics

Prefix and Course Number: PHYS 100

Date: 6/28/22

Course Learning Outcomes:

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

1. Demonstrate understanding of the nature of science.
2. Demonstrate understanding of the scientific method and how it helps in fostering critical thinking and problem-solving skills in science.
3. Demonstrate knowledge of the basic concepts and language of Physics.
4. Understand and demonstrate knowledge of how physical phenomena affects and relates to everyday life.
5. Understand and demonstrate knowledge of the basic laws of Physics pertaining to a selection of the following topics:
 - a. Mechanics
 - b. Thermodynamics
 - c. Waves
 - d. Optics
 - e. Electricity and magnetism
 - f. Relativity
 - g. Quantum
 - h. High Energy
6. Demonstrate ability to work in groups to perform laboratory experiments, acquire data based on the experiment and analyze the data then make a presentation about the results in a written form.

Course Outline:

- I. About Science
 - A. Scientific Measurements
 - B. Mathematics as the language of science
 - C. Scientific Methods
 - D. Science and Technology
- II. Newton's First Law of Motion – Inertia
 - A. Early scientists' perspective about motion
 - B. Newton's 1st law of motion and its applications
 - C. Forces and Equilibrium Rules
- III. Linear Motion
 - A. Speed, Velocity and Acceleration
 - B. Free Fall Motion
- IV. Newton's Second Law
 - A. How forces cause acceleration
 - B. Friction
 - C. Mass and Weight
 - D. Newton's 2nd Law of Motion and its Applications
 - E. Non-free fall motion
- V. Newton's Third Law and Vector Addition
 - A. Forces and Interaction
 - B. Newton's 3rd Law of Motion and its Applications
 - C. Forces as vectors
- VI. Momentum

- A. Definition of momentum
- B. Impulse and how it changes momentum of an object
- C. Collisions and conservation of linear momentum
- VII. Energy
 - A. Definition of Work and Power
 - B. Potential Energy, Kinetic Energy and Work-Theorem
 - C. Conservation of Energy
 - D. Machines and Efficiency
 - E. Sources of Energy
- VIII. Rotational Motion
 - A. Circular Motion
 - B. Rotational Inertia
 - C. Torque
 - D. Center of Mass and Center of Gravity
 - E. Centripetal and Centrifugal forces
 - F. Angular Momentum
 - G. Conservation of Angular Momentum
- IX. Gravity
 - A. The Universal Law of Gravity
 - B. Gravity and Distance
 - C. Weight and Weightlessness
 - D. Ocean Tides
 - E. Gravitational Fields
 - F. A brief on Einstein Theory of Gravity and Black Holes
- X. Projectile Motion and Satellites
 - A. Projectile Motion
 - B. Satellites
 - C. Kepler's Laws of Planetary Motion
 - D. Energy Conservation and Satellite Motion
- XI. Liquids
 - A. Pressure and pressure in liquids
 - B. Archimedes' Principle
 - C. Flotation
 - D. Pascal Principle
 - E. Surface Tension and Capillarity
- XII. Gases
 - A. The atmosphere and atmospheric pressure
 - B. Boyles' Law
 - C. Buoyancy in Air
 - D. Bernoulli's Principles
- XIII. Temperature, Heat and Expansion
 - A. Definition of temperature and heat
 - B. Heat Measurements
 - C. Specific Heat Capacity
 - D. Thermal Expansion of solids and water
- XIV. Heat Transfer
 - A. Conduction, Convection and Radiation
 - B. Newton's Law of Cooling
 - C. The Greenhouse Effect
- XV. Phase Changes
 - A. Evaporation, Condensation and Boiling and their applications
 - B. Melting and Freezing
 - C. Energy changes during Phase Change

- XVI. Vibrations and Waves
 - A. Wave Description
 - B. Interference
 - C. Doppler Effect
- XVII. Sound
 - A. Origin of Sound
 - B. Nature of Sound in Air
 - C. Media that transmit sound
 - D. Speed of sound in air
 - E. Reflection and Refraction of sound
 - F. Forced Vibration and Natural Frequency
 - G. Resonance and Interference
 - H. Beats
- XVIII. Electrostatics
 - A. Electric Forces
 - B. Electric Charges
 - C. Coulomb's Law
 - D. Charging Processes
 - E. Electric Fields
 - F. Electric Energy Storage
- XIX. Electric Current
 - A. Flow of Charge
 - B. Electric Current
 - C. Voltage Sources
 - D. Electrical resistance
 - E. Ohm's Law
 - F. Direct and Alternating Current
 - G. Electric Power
 - H. Electric Circuits
 - I. Electrical Safety
- XX. Magnetism
 - A. Magnetic Forces and Magnetic Poles
 - B. Magnetic Fields
 - C. Magnetic Domains
 - D. Electric Currents and Magnetic Fields
 - E. Magnetic Forces on moving charges
 - F. Magnetic Forces on Current Carrying Wires
 - G. Earth's Magnetic Field
- XXI. Atomic Nucleus and Radioactivity
 - A. X-rays and Radioactivity
 - B. Alphas, Beta and Gamma rays
 - C. The Nucleus
 - D. Half- Life
 - E. Radiometric Dating
 - F. Effects of Radiation on Humans
- XXII. Nuclear Fission and Fusion
 - A. Nuclear Fission and Reactors
 - B. Nuclear Fusion and Controlling Fusion
 - C. Mass-Energy Equivalence.