

Print Date: 11/4/19
Spokane Community College
Course Learning Outcomes and Outline

Course Title: General Physics
Prefix and Course Number: PHYS 103

Course Learning Outcomes:

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

- Explain physics principles and state pertinent facts pertaining to electricity, magnetism and modern physics.
- 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. Electric Forces and Electric Fields
 - A. Charged objects and Electric Force
 - B. Charging processes
 - C. Coulomb's Law
 - D. Electric Field and Field Lines
 - E. Gauss's Law
 - F. Concepts and Calculations
- II. Electric Potential and Electric Potential Energy
 - A. Potential Energy
 - B. Electric Potential Difference
 - C. Electric Potential Difference Created by Point Charges
 - D. Equipotential Surface and relation to Electric Field
 - E. Capacitors and Dielectrics
 - F. Biomedical Application of Electric Potential Differences
 - G. Concepts and Calculations
- III. Electric Circuits
 - A. Electromotive Force and Current
 - B. Ohm's Law
 - C. Resistance and Resistivity
 - D. Electric Power
 - E. Alternating Current
 - F. Series and Parallel Wiring
 - G. Kirchhoff's Rules
 - H. Capacitors in series and parallel
 - I. RC Circuits
 - J. Safety and Physiological Effects of Current
 - K. Concepts and Calculations
- IV. Magnetic Forces and Magnetic Fields
 - A. Magnetic Fields
 - B. The Force That a Magnetic Field Exerts on a Moving Charge
 - C. The Motion of a Charged Particle in a Magnetic Field
 - D. The Force on a Current in a Magnetic Field
 - E. The Torque on a Current-Carrying Coil
 - F. Magnetic Fields Produced by Currents

- G. Ampère's Law
- H. Magnetic Materials
- I. Concepts and Calculations Problems
- V. Electromagnetic Induction
 - A. Induced Emf and Induced Current
 - B. Motional Emf
 - C. Magnetic Flux
 - D. Faraday's Law of Electromagnetic Induction and Lenz's Law
 - E. The Electric Generator
 - F. Mutual Inductance and Self-Inductance
 - G. Transformers
 - H. Concepts and Calculations
- VI. Alternating Current Circuits
 - A. Capacitors and Capacitive Reactance
 - B. Inductors and Inductive Reactance
 - C. Circuits Containing Resistance, Capacitance, and Inductance
 - D. Resonance in Electric Circuits
 - E. Semiconductor Devices
 - F. Concepts and Calculations
- VII. Special Relativity
 - A. Events and Inertial Reference Frames
 - B. The Postulates of Special Relativity
 - C. The Relativity of Time: Time Dilation
 - D. The Relativity of Length: Length Contraction
 - E. Relativistic Momentum
 - F. The Equivalence of Mass and Energy
 - G. The Relativistic Addition of Velocities
 - H. Concepts and Calculations Problems
- VIII. Particles and Waves
 - A. The Wave–Particle Duality
 - B. Blackbody Radiation and Planck's Constant
 - C. Photons and the Photoelectric Effect
 - D. The Momentum of a Photon and the Compton Effect
 - E. The De Broglie Wavelength and the Wave Nature of Matter
 - F. The Heisenberg Uncertainty Principle.
 - G. Concepts and Calculations Problems
- IX. The Nature of the Atom
 - A. Rutherford Scattering and the Nuclear Atom
 - B. Line Spectra
 - C. The Bohr Model of the Hydrogen Atom
 - D. De Broglie's Explanation of Bohr's Assumption about Angular Momentum
 - E. The Quantum Mechanical Picture of the Hydrogen Atom.
 - F. The Pauli Exclusion Principle and the Periodic Table of the Elements
 - G. X-rays and Laser
 - H. Concepts and Calculations Problems
- X. Nuclear Physics and Radioactivity
 - A. Nuclear Structure
 - B. The Strong Nuclear Force and the Stability of the Nucleus
 - C. The Mass Defect of the Nucleus and Nuclear Binding Energy
 - D. Radioactivity
 - E. The Neutrino
 - F. Radioactive Decay and Activity

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- G. Radioactive Dating
- H. Radioactive Decay Series and Radiation Detectors
- I. Concepts and Calculations Problems
- XI. Ionizing Radiation, Nuclear Energy, and Elementary Particles
 - A. Biological Effects of Ionizing Radiation
 - B. Induced Nuclear Reactions
 - C. Nuclear Fission, Nuclear Fusion and Nuclear Reactors
 - D. Elementary Particles
 - E. Cosmology.
 - F. Concepts and Calculations Problems