

**ACTIVE COURSE FILE**B. \*Curricular Area: Physics Course Number: 1100Course Title: PhysicsSemester Credit Hours: 4 Lecture Hours: 3 Lab Hours: 3 Clinical Hours: 0

\*Changes from the present course must be accompanied by a yellow Course Revision or Deletion Form.

Course description to appear in catalog:

Conceptual study of laws of motion, forces, energy and momentum, properties and states of matter, heat and thermodynamics, wave motion, sound, light, electricity and magnetism, and atomic and nuclear physics.

Prerequisite:

MATH 0481 with a grade of C or better or a qualifying score on the mathematics placement test.

## A. General Course Objectives

Upon successful completion of this course the student should be able to do the following:

1. Use observations to formulate hypotheses
2. Demonstrate a functional understanding of physical phenomena and their relationships to daily living
3. Describe the relationships among different units of measure
4. Interpret and explain the relationships among an object's position, displacement, velocity, and acceleration
5. Identify and distinguish different types of forces and identify the reaction force to any action force
6. Describe and calculate the effect of external forces on an object's motion
7. Create and label simple free-body diagrams
8. Identify and calculate the different forms of energy (potential, kinetic, and mechanical) and describe how energy is converted from one form to another
9. Deduce the outcome of collisions of two particles
10. Interpret and describe the relationships among an object's angular position, displacement, velocity, and acceleration
11. Describe and calculate the effect of external torques on an object's rotation
12. Determine the stability of an object using the relationship between center of gravity and support base
13. Classify matter and differentiate among elements, compounds, atoms, and molecules
14. Identify the constituents of an atom and how they are organized
15. Differentiate among density, mass, volume, and weight
16. Calculate stretch or compression of an elastic body using Hooke's law

17. Determine buoyancy using Archimedes' principle
18. Identify the differences among heat, temperature, and internal energy
19. Explain how matter behaves when it absorbs or releases thermal energy
20. Apply the relationship among heat, mass, and change in temperature
21. Explain the differences among conduction, convection, and radiation and identify thermal conductors and insulators
22. Identify the direction of heat
23. Recognize that energy is conserved and that energy goes from more useful to less useful forms
24. Distinguish between transverse and longitudinal waves and provide examples of each
25. Describe the relationships among amplitude, frequency, period, wavelength, and wave speed of a wave
26. Calculate positions of maximum destructive and constructive interference for waves
27. Explain how sound waves travel and describe Doppler shifts
28. Identify, construct, and analyze simple electric circuits (series and parallel circuits)
29. Describe the flow of electricity in terms of voltage, current, and charge and demonstrate mathematical understanding of the relationship among amperes, volts, and coulombs
30. Explain what happens when a magnet moves through a wire coil (and vice versa)
31. Explain how electromagnets and transformers work
32. Describe the relationship between the color of a glowing object and its temperature
33. Compare color mixing of light and color mixing of paints
34. Describe image characteristics produced by plane, concave, and convex mirrors
35. Describe image characteristics produced by plane, concave, and convex lenses
36. Explain the phenomena of reflection and refraction
37. Identify components of the electromagnetic spectrum
38. Differentiate incandescence, fluorescence, and phosphorescence in light emission
39. Explain why atoms are radioactive
40. Describe different types of radiation and their effects
41. Describe nuclear fission and fusion processes and their importance in society

## B. Topical Outline

1. Nature of science
  - a. Units and scientific measurement
  - b. Scientific methodology
  - c. Science and technology
  
2. Mechanics
  - a. Linear motion (position, velocity, and acceleration)
  - b. Forces and Newton's laws of motion
  - c. Momentum and impulse
  - d. Work and energy
  - e. Conservation laws
  - f. Rotational motion, torque, and angular momentum
  - g. Gravity, projectile motion, and satellite motion
  
3. Properties of matter
  - a. Atomic nature of matter
  - b. Structure and classification of matter
  - c. States of matter
  - d. Density and elasticity
  - e. Pressure
  - f. Archimedes' principle and buoyancy
  - g. Pascal's principle
  - h. Boyle's law and Bernoulli's principle
  
4. Heat and thermodynamics
  - a. Temperature, heat, and internal energy
  - b. Specific heat capacity and thermal expansion
  - c. Heat transfer (conduction, convection, and radiation)
  - d. Phase changes and latent heats
  - e. First law of thermodynamics
  - f. Heat engines and efficiency
  - g. Entropy and the second law of thermodynamics
  
5. Vibrations and waves
  - a. Wave description and motion
  - b. Transverse and longitudinal wave
  - c. Wave interference and standing waves
  - d. Sound, beats, and the Doppler effect
  - e. Forced vibrations and resonance
  
6. Electricity and magnetism
  - a. Electric charges, forces, and fields
  - b. Coulomb's law
  - c. Charge conservation
  - d. Electrical potential and electrical potential energy
  - e. Electric circuits and Ohm's law
  - f. Magnetic poles, forces, and fields
  - g. Electromagnets, electromagnetic induction, and transformers

