

PHY 040 - GENERAL PHYSICS I LECTURE
PHY 041 - GENERAL PHYSICS I LABORATORY

- A. **COURSE DESCRIPTION:** A non-calculus, college level physics course. Topics covered include, kinetics, Newton's Laws, energy, power, momentum, heat and sound.
Prerequisite: A working knoweldge of algebra. Does not meet the program requirements of physics, chemistry and math majors.
Four semester hours, three hours of lecture per week, three hours of laboratory per week
- B. **RATIONALE:** This is an introductory course in physics that will cover the areas of kinetics, Newton's Laws, energy, power, momentum, heat and sound. It will not require any previous course work in physics nor the use of the calculus. Therefore, this will not fill the course requirements for physics, chemistry or mathematics majors.
- C. **COURSE OBJECTIVES:**
Upon completion of this course the students will be able to:
1. Explain the basic principles of mechanics, heat, thermodynamics and sound.
 2. Solve physical problems in mechanics, heat, thermodynamics and sound.
 3. Demonstrate skills required to perform laboratory experiments.
- D. **COURSE OUTLINE:**
Topical Outline
1. Composition and Resolution of Vectors
 - a. Standards and units
 - b. Force
 - c. Graphical representation of forces
 - d. Components of Vectors
 - e. Resoultion of Vectors
 - f. Vector difference
 2. Equilibrium
 - a. Equilibrium. Newton's first law
 - b. Newton's third law of motion
 - c. Examples of equilibrium
 - d. Center of gravity
 3. Equilibrium. Moment of Force
 - a. Moment of force
 - b. Second comdition of equilibrium
 - c. Resultant of parallel forces
 - d. Center of gravity
 4. Rectilinear Motion
 - a. Motion
 - b. Average velocity
 - c. Instantaneous velocity

- d. Average and instantaneous acceleration
- e. Rectilinear motion with constant acceleration
- f. Freely falling bodies
- g. Velocity components. Relative velocity
- 5. Gravitation
 - a. Introduction
 - b. Newton's second law. Mass
 - c. Mass and weight
 - d. Newton's law of universal gravitation
 - e. Mass of the earth
 - f. Variation in gravitational acceleration
 - g. Applications of Newton's second law
- 6. Motion in a Plane
 - a. Motion of a projectile
 - b. Circular motion
 - c. Centripetal force
 - d. Motion in vertical circle
 - e. Tangential acceleration
- 7. Work and Energy
 - a. Work
 - b. Work done by a varying force
 - c. Work and kinetic energy
 - d. Gravitational potential energy
 - e. Power
 - f. Power and velocity
- 8. Impulse and momentum
 - a. Impulse and momentum
 - b. Conservation of linear momentum
 - c. Elastic and inelastic collisions
 - d. Newton's second law
- 9. Rotation
 - a. Angular velocity
 - b. Angular acceleration
 - c. Rotation with constant angular acceleration
 - d. Angular velocity and linear velocity
 - e. Kinetic energy of rotation
 - f. Torque and angular acceleration
 - g. Conservation of angular momentum
- 10. Elasticity
 - a. Stress
 - b. Strain
 - c. Elastic modulus
 - d. Force constant
- 11. Harmonic Motion
 - a. Elastic restoring forces
 - b. Definitions
 - c. Equations of simple harmonic motion
 - d. The physical pendulum

- e. The simple pendulum
- f. Angular harmonic motion
- 12. Hydrostatics
 - a. Pressure in fluid
 - b. Hydrostatic paradox
 - c. Archimedes Principle
- 13. Temperature
 - a. Thermometers
 - b. Measurement of temperature
 - c. Linear expansion
 - d. Surface and volume expansion
- 14. Transfer of heat
 - a. Conduction
 - b. Stefan's Law
 - c. Ideal radiator
- 15. Wave Motion
 - a. Propagation of a disturbance in a medium
 - b. Calculation of speed of a transverse pulse
 - c. Calculation of speed of a longitudinal pulse
 - d. Motion of a wave
 - e. Mathematical representation of a wave
- 16. Vibrating Bodies
 - a. Stationary waves in a string
 - b. Vibration of a string fixed at both ends
 - c. Resonance
 - d. Interference of longitudinal waves
 - e. Stationary longitudinal waves
- 17. Acoustical Phenomena
 - a. Pressure variations in a sound wave
 - b. Intensity
 - c. Intensity and loudness
 - d. Quality and pitch
 - e. Doppler effect

E. INSTRUCTIONAL RESOURCES:

Beiser. Modern Technical Physics, 6th ed. Addison-Wesley, 1992.

Beiser. Physics, 5th edition. Addison-Wesley, 1991.

Bueche and Jerde. Principles of Physics, 6th edition. McGraw-Hill Publishing Co., 1994.

Giancoli. Physics: Principles with Applications, 5th ed. Prentice-Hall, Inc., 1999.

Halliday, Walker and Resnick. Fundamentals of Physics, 6th ed. John Wiley and Sons, Inc., 2000.

Hecht. Physics. Brooks-Cole Publishing Co., 1994.

Ohnian. Physics, 2nd ed. W. W. Norton Co., 1989.

Sandler, Bouadana & Sears. College Physics, 7th ed., Addison Wesley, 1999.

Sears, Zemansky, and Young. College Physics, 7th edition. Addison-Wesley Publishing Co., 1991.

Serway, Faughn, Vuille & Bennett: College Physics (with PhysicsNow), 7th ed., Brooks Cole, 2006.

F. LABORATORY EXERCISES:

1. Force Tables
2. The Ladder
3. Friction and the inclined plane
4. Acceleration
5. Centripetal force
6. Work and the Inclined Plane
7. Ballistic Pendulum
8. Angular Acceleration
9. Moment of Inertia
10. Harmonic Motion
11. Torsion Pendulum
12. Compound Pendulum
13. Specific Heat