General Physics (1)

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Prerequisites
PHY	101	General Physics (1)	3	2	0	2	-

Objectives:

At the End of the course, students will be able to:

- Understand the motion in one, two and three dimensions as well as linear and circular motions;
- Understand and apply the Newton's law of motion, work, kinetic, potential energies and their conservation phenomena;
- Understand the concept of momentum in both linear and circular motions.

Syllabus:

Motion in one Dimension: Position, Velocity, Speed, instantaneous Velocity and Speed. Acceleration. Motion Diagrams. One-Dimensional Motion with Constant Acceleration. Freely Falling Objects, Kinematic Equations.

Vectors: Vector and Scalar Quantities, Some Properties of Vectors, Components of a vector and Unit Vectors.

Motion in two dimensions: The Position, Velocity, and Acceleration Vectors, Two-Dimensional Motion with Constant Acceleration, Projectile Motion, Uniform Circular Motion, Tangential and Radial Acceleration, Relative Velocity and Relative Acceleration.

The law of motion: The Concept of Force, Newton's First Law and Inertial Frames, Mass, Newton's Second Law, The Gravitational Force and Weight, Newton's Third Law, Some Applications of Newton's Laws, Forces of Friction.

Circular motion and other: Newton's Second Law Applied to Uniform Circular Motion, Non-uniform Circular Motion, Motion in Accelerated Frames, Motion in the Presence of Resistive Forces, Numerical Modeling in Particle Dynamics.

Application of Newton's Law.

Work and kinetic energy: Systems and Environments, Work Done by a Constant Force, The Scalar Product of Two Vectors, Work Done by a Varying Force, Kinetic Energy and the Work--Kinetic Energy Theorem, The Non-Isolated System--Conservation of Energy, Situations Involving Kinetic Friction, Power, Energy and the Automobile.

Potential energy and conservation of energy: Potential Energy of a System, The Isolated System-Conservation of Mechanical Energy, Conservative and Nonconservative Forces, Changes in Mechanical Energy for Nonconservative Forces, Relationship Between Conservative Forces and Potential Energy, Energy Diagrams and equilibrium of a System.

Linear momentum and collisions: Linear Momentum and Its Conservation, Impulse and Momentum. Collisions in One Dimension, Two-Dimensional Collisions, The Center of Mass, Motion of a System of Particles, Rocket Propulsion.

Rotation of a rigid object about a fixed axis: Angular Position, Velocity, and Acceleration. Rotational Kinematics: Rotational Motion with Constant Angular Acceleration, Angular and Linear Quantities, Rotational Kinetic Energy, Calculation of Moments of Inertia, Torque. Relationship between Torque and Angular Acceleration, Work, Power, and Energy in Rotational Motion. Rolling Motion of a Rigid Object.

Rolling motion and angular momentum: The Vector Product and Torque, Angular Momentum. Angular Momentum of a Rotating Rigid Object, Conservation of Angular Momentum, The Motion of Gyroscopes and Tops, Angular Momentum as a Fundamental Quantity.

References:

- *Physics for Scientists and Engineers (with modern physics);* Serway R. A. and Jewett J. W. Brooks Cole, .
- *Physcis*,9th Ed.; Halliday D. and Resnick R., John Wiley & sons, 2011.