Physics 111 – General Physics I –Contents

Leading numerals correspond to the chapters in the textbook

1. Introduction and Mathematical Concepts
   1.1 Trigonometry
   1.2 Mechanical Units and Powers of Ten
   1.3 Units and Dimensional Analysis
   1.4 Scalars and Vectors; Graphical Summation of Vectors
   1.5 Vector Components; Analytical Summation of Vectors

2. Kinematics in one Dimension
   2.1 Basic Concepts of Displacement, Velocity and Acceleration
   2.2 Graphical Analysis of Velocity and Acceleration for Straight-Line Motion
   2.3 The Equations of Kinematics for Straight-Line Motion
   2.4 Free Fall

3. Kinematics in two Dimensions
   3.1 Displacement, Velocity and Acceleration
   3.2 Projectile Motion with Horizontal Initial Velocity
   3.3 Projectile Motion – General Case
   3.4 Maximum Range and Air Resistance
   3.5 Relative Motion

4. Forces and Newton’s Laws of Motion
   4.1 Newton’s Laws
   4.2 The Gravitational Force
   4.3 The Normal Force and Apparent Weight
   4.4 Static and Kinetic Friction
   4.5 Motion on an Incline
   4.6 Tension

5. Circular Motion and Centripetal Force
   5.1 Uniform Circular Motion and Centripetal Acceleration
   5.2 The Centripetal Force
   5.3 Motion on a Vertical Circle
   5.4 Apparent Weightlessness and Artificial Gravity

6. Work and Energy
   6.1 The Definition of Work and the Work-Energy Theorem
   6.2 Conservation of Mechanical Energy
   6.3 Power

7. Impulse and Momentum
   7.1 Impulse and the Impulse-Momentum Theorem
   7.2 Conservation of Linear Momentum and Collisions
   7.3 Center of Mass

8. Rotational Kinematics
   8.1 Angular Displacement, Velocity and Acceleration
   8.2 The Equations of Rotational Kinematics
   8.3 Angular Variables and Tangential Variables
   8.4 Centripetal Acceleration and Tangential Acceleration
   8.5 Rolling Motion

9. Rotational Dynamics
   9.1 The Concept of Torque
   9.2 Translational and Rotational Equilibrium
   9.3 Newton’s Second Law for Rotational Motion
   9.4 Rotational Work and Energy
   9.5 Angular Momentum

10. The Ideal Spring and Harmonic Motion
    10.1 The Ideal Spring and Hooke’s Law
    10.2 Elastic Potential Energy
    10.3 Simple Harmonic Motion
    10.4 Damped Harmonic Motion and Driven Harmonic Motion; Resonance
    10.5 The Mathematical and Physical Pendulum