



Unit III: Work, Energy and Power Chapter 7, 8 1-2 weeks

Topics: work, work-energy theorem, conservative forces and potential energy, conservation of energy, power

*Suggested Lab:* Spring-loaded Cart Lab

Unit IV: Systems of Particles—Linear Momentum Chapter 9 1-2 weeks

Topics: impulse, momentum, conservation of linear momentum, collisions, center of mass

*Suggested Lab:* Cart Collisions

Unit V: Circular Motion and Rotation Chapter 10, 11 2-3 weeks

Topics: uniform circular motion, angular momentum, torque, rotational kinematics, statics, and dynamics

*Suggested Labs:* Centripetal Acceleration, Rotational Equilibrium, Rotational Inertia Lab

Unit VI: Oscillations Chapter 15 1 week

Topics: simple harmonic motion (SHM) spring and mass motion, pendulum motion, relationship to uniform circular motion, relationship to conservation of energy, derivation from differential equation

*Suggested Lab:* Interactive Physics SHM Simulation

Unit VII: Gravitation Chapter 13 1 week

Topics: Newton's Law of Gravity, Gravitational Potential Energy, Kepler's laws,

*Suggested Lab:* computer simulation of planetary motion

## II. ELECTRICITY AND MAGNETISM

Unit X: Electrostatics Chapter 21, 23 2-3 weeks

Topics: charge, field, potential, Coulomb's law, point charges, point-charge field and potential, electric fields of a variety of charge distributions (rings, disks, spheres, parallel plates, cylindrical shells), Gauss's law with applications

*Suggested Lab:* Scotch Tape Lab

Unit XI: Conductors and Capacitors Chapter 24, 25 2-3 weeks

Topics: electrostatics with conductors, capacitors, dielectrics, use of calculus and Gauss's Law to derive expressions related to electric fields

*Suggested Lab:* Capacitor Discharge Lab

Unit XII: Electric Circuits Chapters 26, 27 2-3 weeks

Topics: current, resistance, power, ac, versus dc circuits, Kirchhoff's Rules, capacitors in circuits, RC Time Constant 1 and 2

*Suggested Labs:* Ohm's Law, Series and Parallel Circuits, Capacitors in Circuits

Unit XIII: Magnetism Chapter 28, 29 2-3 weeks

Topics: forces on moving charges in magnetic fields, 3 right hand rules, torque on loops of wire, Biot-Savart Law and applications, Ampere's Law and applications

*Suggested Lab:* Current Carrying Wire with Iron Filings

Unit XIV: Electromagnetic Induction Chapter 30-32 3-4 weeks

Topics: magnetic flux, Faraday's law of EM induction, Lenz's law, inductance (including LR and LC circuits), use of differential equations to analyze circuits, Maxwell's Equations

*Suggested Lab:* Motor Lab, LR and LC circuit lab