

**Haverford College - Physics Department**  
**Physics 102b: Classical and Modern Physics I**  
**F. Crawford**  
**Spring 2003 Course Topics**

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**Oscillations (Hecht Ch. 10):** Hooke's Law; Stress and Strain; Elastic Moduli; Simple Harmonic Motion; Pendulum; Damping, Forcing, and Resonance

**Waves and Sound (Hecht Ch. 11):** Wave Characteristics; Transverse and Compression Waves; Sound Waves; Wavefronts and Intensity; Speed of Sound; Sound Level; Sound Beats; Standing Waves; Doppler Effect

**Electrostatics (Hecht Ch. 15, 16):** Charge; Insulators and Conductors; Coulomb's Law; The Electric Field; Gauss's Law; Electric Potential; Equipotentials; Charge Distributions; Capacitors; Energy in Capacitors

**DC Circuits (Hecht Ch. 17, 18):** Electric Current; Resistance; Ohm's Law; Resistivity; Voltages; Energy and Power; Current Density; Conductivity; Internal Resistance; Electromotive Force; Resistors in Series and Parallel; RC Circuits; Kirchoff's Rules

**Magnetism (Hecht Ch. 19):** Magnets; Magnetic Field; Currents and Magnetic Fields; Magnetic Force on Moving Charges; Magnetic Force on Current Wires

**Induction (Hecht Ch. 20):** Faraday's Induction Law; Motional emf; AC and DC Generators; Inductance; RL Circuits; Field Energy

**Light (Hecht Ch. 22):** Electromagnetic Waves; Energy and Irradiance; Origin of Radiation; Energy Quanta; Atoms and Light; Electromagnetic Spectrum

**Scattering (Hecht Ch. 23):** Rayleigh Scattering; Internal and External Reflection, Index of Refraction; Snell's Law; Total Internal Reflection

**Geometric Optics (Hecht Ch. 24):** Aspherical Lenses; Spherical Thin Lenses; Focal Points and Focal Planes; Single and Combination Lenses; Curved Mirrors

**Physical Optics (Hecht Ch. 25):** Polarization; Polarizers; Interference; Young's Experiment; Single-Slit Diffraction; Diffraction Gratings; Circular Holes and Obstacles

**AC Circuits (Hecht Ch. 21):** Alternating Current and Resistance, Inductance, and Capacitance; Reactance and Impedance; LCR Series Circuits; Real and Apparent Power; AC Series Resonance

**Quantum Physics (Hecht Ch. 27, 28, 29):** Radioactivity;  $\alpha$ -particles,  $\beta$ -rays,  $\gamma$ -rays, and X-rays; Atomic Spectra; Radiation Damage; Blackbody Radiation; The Photoelectric Effect; Bremsstrahlung; Compton Effect; Bohr Atom; Lasers; de Broglie Waves; Quantum Numbers; Zeeman Effect; Spin; Uncertainty Principle

**Nuclear Physics (Hecht Ch. 30):** Radioactive Decay; Half-Life; Fission and Fusion