

KAP Physics B

Syllabus

Dublin Jerome High School

Mr. Falquet

Course Overview

This course seeks to provide students with an understanding of basic concepts of physics in preparation for the advanced placement examination. Emphasis is on the fields of mechanics, fluids, thermodynamics, sound, electromagnetism, optics and modern physics. Students are provided with an opportunity to develop advanced problem solving skills that can be applied to many fields of endeavor. A block schedule allows students to learn from group activity over two 50-minute periods per day. A total of 22 required labs are completed. A lab notebook, detailed chapter outlines, and peer reviewed presentations all serve to complete the student course portfolio. Students initially develop a conceptual approach to problem solving and a “process” rather than “product” approach to lab inquiry. The study of Physics enhances development of a questioning attitude and creative thought processes while making multiple connections between mathematics and our universe.

Textbooks

College Physics, 5TH ed. by Serway and Faughn

College Physics, Study Guide and Student Solutions Manual

Course Outline

I. NEWTONIAN MECHANICS

Unit I: Kinematics Chapters 2, 3 2-4 weeks

Topics: motion in one dimension, motion in two dimensions, projectile motion

Suggested Labs: PVA Measurement Lab, Projectile Motion Lab

Unit II: Newton’s Laws of Motion Chapter 4 1-2 weeks

Topics: static equilibrium, single particle dynamics, systems of two or more bodies

Suggested Labs: Atwood, Mass and Pulley

Unit III: Work, Energy and Power Chapter 5 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 6 1-2 weeks

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

Suggested Lab: Elastic Collisions

Unit V: Circular Motion and Rotation Chapter 7 1 week

Topics: uniform circular motion, torque, rotational statics

Suggested Labs: Centripetal Acceleration, Rotational Equilibrium, Turning Point. Whirligig

Unit VI: Gravitation Chapter 7 1 week

Topics: Newton's Law of Gravity, Kepler's laws,

Suggested Lab: computer simulation of planetary motion, Diluting Gravity 1 and 2

Unit VII: Oscillations Chapters 7-8 1 week

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

Suggested Lab: Interactive Physics SHM Simulation, Hooke's Law and Harmonic Motion

II. FLUID MECHANICS AND THERMAL PHYSICS

Unit VIII: Temperature and Heat Chapters 10, 11 2-4 weeks

Topics: mechanical equivalent of heat, specific and latent heat, heat transfer, thermal expansion

Suggested Lab: Specific Heat Lab

Unit IX: Kinetic Theory and Thermodynamics Chapter 12 1-2 weeks

Topics: kinetic model of ideal gases, ideal gas law, laws of thermodynamics

Suggested Lab: Absolute Zero Extrapolation

III. ELECTRICITY AND MAGNETISM

Unit X: Electrostatics Chapter 15 1 week

Topics: charge, field, potential, Coulomb's law, point charges, point-charge field and potential

Suggested Lab: Scotch Tape Lab

Unit XI: Conductors and Capacitors Chapter 16 1-2 weeks

Topics: electrostatics with conductors, capacitors, dielectrics

Suggested Lab: Capacitor Discharge Lab

Unit XII: Electric Circuits Chapters 17, 18 2-3 weeks

Topics: current, resistance, power, a.c., versus d.c. circuits

Suggested Labs: Ohm's Law 1 and 2, Series and Parallel Circuits, Electrical Power and Batteries 1 and 2, RC Time Constant 1 and 2

Unit XIII: Magnetism Chapter 19 1-2 weeks

Topics: forces on moving charges in magnetic fields, 3 right hand rules

Suggested Lab: Current Carrying Wire with Iron Filings, Magnetic Fields 1 and 2

Unit XIV: Electromagnetic Induction and Waves Chapter 20, 21 1-2 weeks

Topics: magnetic flux, Faraday's law of EM induction, Lenz's law

Suggested Lab: Motor Lab

IV. WAVES AND OPTICS

Unit XV: Wave Motion Chapters 13, 14, 22 3-4 weeks

Topics: properties of standing waves, Doppler effect, superposition, interference and diffraction, dispersion of light and EM spectrum

Suggested Labs: Snell's Law, Resonance Speed of Sound

Unit XVI: Geometric Optics Chapters 23-25 1-2 weeks

Topics: reflection, refraction, mirrors, lenses

Suggested Lab: lens and mirror lab, Diffraction grating, Geometric Optics

IV. ATOMIC AND NUCLEAR PHYSICS

Unit XVII: Atomic Physics and Quantum Effects Chapters 27, 28 2-3 weeks

Topics: parts of the atom, alpha particle scattering and the Rutherford Model, photons and the photoelectric effect, the Bohr Model, wave-particle duality

Suggested Lab: Gas Emission Tubes—Spectral Lines, Planck's Constant, Photoelectric Effect

Unit XVIII: Nuclear Physics Chapter 29, 30 1-2 weeks

Topics: radioactivity, half-life, nuclear reactions, mass and energy effects

Suggested Lab: M and M Half Life