Course Code: S404AP
Board Approval Date: August 27, 2018

AP Physics-2

COURSE REVIEW

AP Physics 2 is the second year of a two year algebra based curriculum which covers all topics found in a typical college introductory physics course. AP Physics 2 will continue to develop the skills needed to succeed not only in physics, but in the college classroom. Laboratory investigation focused on developing critical thinking and reasoning skills, along with traditional classroom work (i.e. quizzes & exams), and homework, will be the primary assessment tool used during the year.

Enrolling students must have met the following two requirements: completed physics 1 with at least a 90% final average and either has completed or is currently enrolled in pre-calculus 1.

INSTRUCTIONAL TIME

The instructional time is based on an A-day through F-day cycle (6 consecutive school days). Laboratory time is built into a cycle by scheduling an extra period on 2 selected days during each cycle, therefore providing eight instructional periods per cycle. Laboratory activities and visualizing solutions to problems by computer modeling are scheduled for double period days.

TEXT

College Physics a strategic approach: Knight, Randall Dewey, and Brian Jones. Third ed.

COURSE GRADE

50% TEST and QUIZ: Test format is based on the AP exam.
25% LABORATORY REPORTS: The written report is to contain the following items: hypothesis, experimental design, observations/data table(s), calculation examples, conclusion(s), error analysis.
25% HOMEWORK: problems/questions

UNITS

4 cycle -- Fluid statics and dynamics
4 cycles -- Thermodynamics with kinetic theory
3 cycles -- Electrostatics
4 cycles-- Electrical circuits with capacitors
4 cycles-- Magnetic fields and Electromagnetism
4 cycles-- Physical and geometric optics
4 cycles-- Topics in modern physics
NOTE: Remaining time will be used to review for the AP exam given in May.

4 weeks-- Fluid statics and dynamics
• Pressure: atmospheric and fluid pressure • Pascal's principle • Buoyant force • Archimedes' principle • Flow rate • Continuity equation • Bernoulli's principle

labs: pressure, hydrometer, Archimedes, Bernoulli/Venturi, water projectile

4 weeks-- Thermodynamics with kinetic theory
• Heat transfer (conduction, convection, radiation) • Mechanical equivalent of heat • Kinetic theory • Ideal gases • First law of thermodynamics • Thermodynamic processes and PV diagrams • Heat engines • Carnot cycle • Efficiency • Second law of thermodynamics: entropy

labs: heat engine, heat transfer, temperature and kinetic theory, entropy

3 weeks—Electrostatics
• Electric Force • Electric Field • Electric Potential • Capacitance

labs: electric potential mapping, dielectric constant and parallel plate capacitor lab, simulations

4 weeks-- Electrical circuits with capacitors
• Resistivity • Ohm's Law • DC circuits with resistors only • Kirchhoff's Laws • Series, parallel and series-parallel circuits • Capacitors • DC circuits with resistors and capacitors

labs: Conductivity,resistivity,voltage sources, capacitors, circuits resistors

4 weeks-- Magnetic fields and Electromagnetism
Magnetic field • Magnetic force on a charged particle • Magnetic force on a current-carrying wire • Magnetic flux • Electromagnetic induction: Faraday's Law • Lenz's law • Motional emf

labs: magnetism, mass of the electron, measurement of a magnetic field, electromagnetic induction, Faraday's Law, electric motors, determine number of loops in solenoid, Lenz's Law

4 weeks-- Physical and geometric optics
Reflection • Image formation by flat and curved mirrors • Refraction, Snell's Law, total internal reflection • Image formation by thin lenses • Interference and diffraction • Double slit, single slit and diffraction grating interference • Thin film interference

labs: mirrors lab, refraction/total internal reflection lab, lenses lab, diffraction and interference, thin film interference lab, interferometer thermal expansion, holograms, Determining the Thickness and Refractive Index of a Mirror

4 weeks-- Topics in modern physics
Models of light: wave and particle • Photon interactions (Compton, photoelectric, electron excitation, pair production) • Atomic energy levels • Absorption and emission spectra • de Broglie wavelength • Wave function graphs • Atoms, atomic mass, mass number and isotopes • Radioactive decay: alpha, beta and gamma decay • Mass-energy equivalence • Half-life • Conservation of nucleon number: fission and fusion

labs: hydrogen spectrum, photoelectric effect, half-life, stochastic nature of radiation, Planck's constant