Department: Science Department
Course Name: AP Physics II

Course Description:
This two-semester course concentrates on the basic principles of physics equivalent to a second-semester college course in algebra-based physics and is appropriate for students interested in pursuing further scientific or technical interests in college. Topics studied include fluid mechanics, thermodynamics, electricity & magnetism, optics, atomic, and nuclear physics. A strong emphasis is placed on problem solving. Mathematical relationships are developed and applied. This is a full laboratory course and completion of formal laboratory reports is required.

Content:
Mechanics Review
Fluid Dynamics
Pressure and Density
Pressure variation with depth
Pascal's principle
Mass and volume flow rate
Continuity principal and equation
Bernoulli's principal and equation
Temperature and Heat
Specific and latent heat (calorimetry)
Heat transfer (Newton's law of cooling)
Thermal expansion
Kinetic Theory and Thermodynamics
Ideal gases
Laws of Thermodynamics (Carnot cycle, heat engines, entropy)
Wave motion
Traveling and standing waves
Doppler Effect
Superposition (resonance)
Physical Optics
Geometric Optics (reflection/refraction with mirrors and lenses)
Interference and diffraction
Dispersion of light and electromagnetic spectrum
Electrostatics (review from AP Physics I)
Charge, field, potential
Coulomb's law
Conductors, Capacitors and Dielectrics
Electric Circuits
Ohm's Law
Equivalent resistance and capacitance
Kirchoff's voltage and current rules
Magnetostatics
Forces on moving charges in magnetic fields
Forces on current carrying wires in magnetic fields
Magnetic fields of long current carrying wires (Ampere's Law)
Electrodynamics

Faraday's law of induction (AC/DC motors and generators)
Lenz's law (polarity of induced EMF)
Special Relativity
Atomic physics and quantum effects
Photons and photoelectric effect
Bohr model of Hydrogen (energy levels, transitions)
Wave-particle duality
X-Ray production
Compton scattering
Nuclear Physics
Radioactivity and half-life
Nuclear reactions (conservation of baryon number, quantum #'s)
Electroweak unification (W^{+-}, Z^{o} , γ- gauge particles)
Quarks and leptons (color, gluons, strong interactions, QCD)

Skills:
Collaborate to gather data
Generate and interpret data in graphical form
Construct sophisticated lab reports with computer generated graphics and equations
Analyze and represent data graphically using spreadsheets
Utilize advanced features of a scientific graphing calculator

Text and Materials:
Serway & Faughn, College Physics (Saunders College Publishing. 6th edition, 2001)
(WebAssign Homework account required www.webassign.net)

Methods of Instruction:
Lecture
Real time (live) demonstrations
Java, Internet, DVD computer demonstrations
Laboratory experiments
Homework tutorials
Quiz, Test, and Homework review
iPad notes and visualizations
iPad data collection and analysis
Computer projects

Methods of Evaluation:
Laboratory experiments
Data analysis
Laboratory reports
Inquiry virtual labs
Activity worksheets
Homework
Quizzes
Tests