Department: Science Department
Course Name: Advanced Placement Physics I

Course Description:
This two-semester course concentrates on the basic principles of physics equivalent to a first-semester college course in algebra-based physics and is appropriate for students interested in pursuing further scientific or technical interests in college. Topics include the following: Kinematics, Newtonian mechanics (including rotational dynamics, torque, and angular momentum), gravitation, work, energy, power, oscillations, and fluid properties. 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. Co-requisite: Honors Algebra II/Trigonometry or higher.

Content:
Kinematics (including vectors, coordinate systems, displacement, velocity, acceleration)
Motion in 1-Dimension (graphical representations; slope/area connections)
Motion in 2-Dimensions (projectile motion, uniform circular motion, relative velocity)
Newton's Laws of Motion, Static Equilibrium.
One-body systems (applications of 2^{nd} law)
Two-body and few-body systems (applications of 2^{nd} & 3^{rd} law)
Work, Energy, Power
Work-Energy theorem
Conservative forces and potential energy
Conservation of energy
Closed Systems of Particles/Linear Momentum
Impulse and momentum
Conservation of linear momentum (collisions)
Rotational Kinematics
Centripetal Force/Newton's Law of Gravitation
Torque (rotational acceleration and equilibrium)
2^{nd} Moment of (rotational) inertia
Angular momentum (conservation of angular momentum)
Oscillations (Periodic Systems)
Simple harmonic motion
Mass on a spring/simple pendulum
Fluid Properties (density, pressure, mass flow rate)
Archimede's principle, Pascal's principle, Bernoulli's principle, Continuity principle

Skills:
Collaborate to gather data
Generate and interpret data in graphical form
Write sophisticated laboratory report
Analyze and graphically represent data using spreadsheets
Apply advanced features of a scientific graphing calculator
Read precise small distance measurements using a caliper and micrometer

Text and Materials:
John D. Cutnell, Kenneth W. Johnson, David Young, Shane Stadler. Physics (John Wiley & Sons, Inc., 10th edition, 2014)

Methods of Instruction:
Utilize a Learning management system for accessing content, assignments, and assignment submission
Lecture
iPad data collection and analysis
Real time (live) demonstrations
Laboratory experiments
Inquiry based labs
Excel Data analysis tutorials
Homework tutorials
Quiz and Test review
Online Interactive Virtual Labs
AP-Classroom Daily Videos

Methods of Evaluation:
Laboratory collaboration
Data analysis
Laboratory reports
Laboratory procedure
Homework
Quizzes (in-class and online)
Tests (AP-Classroom online)