

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. This course replaces “Honors Physics” and prepares students for Advanced Placement Physics II course. Topics include the following: Newtonian mechanics (including rotational dynamics, torque, and angular momentum), gravitation, work, energy, power, mechanical waves, and sound. 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. Students will complete homework assignments using the internet-based system “WebAssign”, and therefore students enrolled in this course must have home access to a computer and the internet. A small fee will be charged for WebAssign access.

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 2nd law)
Two-body and few-body systems (applications of 2nd & 3rd 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) Rotation/Angular Momentum
Torque (rotational acceleration and equilibrium)
2nd Moment of (rotational) inertia
Angular momentum (conservation of angular momentum)
Oscillations (Periodic Systems)/Newton’s Law of Gravitation
Simple harmonic motion
Mass on a spring/pendulum
Universal Law of Gravitation (orbits, Kepler’s Laws)
Wave motion
Traveling and standing waves
Superposition principle
Interference phenomena
Sound
Diffraction

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:

Cutnell & Johnson. Physics (John Wiley & Sons, 5th edition, 2001)
(WebAssign Homework account required www.webassign.net)

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

Java Applets, Laser Disc, DVD computer 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)

