

**Department:** Science Department  
**Course Name:** AP 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 2<sup>nd</sup> law)

Two-body and few-body systems (applications of 2<sup>nd</sup> & 3<sup>rd</sup> 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)

2<sup>nd</sup> 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](http://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\*)

\*In response to COVID students are required to wear masks in the classroom. Some online assessments and virtual lab activities implemented during remote learning have been incorporated into new classroom computer-based activities. Washing of hands after every lab is enforced.