Course Description

The AP Physics Year 1 course follows an Algebra - Based Curriculum framework that is structured around six "big ideas" of physics that include core scientific principles, theories, and processes. The framework encourages instruction that allows students to make connections across domains through a broader way of thinking about the physical world. Big ideas cut across the traditional physics principles and are supported with enduring understandings, which incorporate the core concepts that students should retain from their learning experiences.

Big idea 1: Objects and systems have properties such as mass and charge. Systems may have internal structure.
Big idea 2: Fields existing in space can be used to explain interactions.
Big idea 3: The interactions of an object with other objects can be described by forces.
Big idea 4: Interactions between systems can result in changes in those systems.
Big idea 5: Changes that occur as a result of interactions are constrained by conservation laws.
Big idea 6: Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.

This course also provides students with opportunities to engage in the AP Science Practices, whereby they establish lines of evidence and use them to develop and refine testable explanations and predictions of natural phenomena. Focusing on these reasoning skills enables teachers to use the principles of scientific inquiry to promote a more engaging and rigorous experience for AP Physics students.

GRADES

I. Major - 60%
   A. Unit Exams – 3x
   B. Free Response – 2x
   C. Quizzes – 1x

II. Minor – 40%

A. Laboratories/Projects -1x

B. Homework -1x

Classroom Policies

I. Absences:

A. Please refer to the Student Code of Conduct for more information.

II. Tardies:

A. Students receiving a tardy, three or more times a semester will lose their semester exam exemption. In addition, students will receive an unexcused absence, if they are tardy three or more times during a grading period.

III. Make - up work:

A. *Excused absences*: The amount of time allowed for completion of make-up work should not exceed the number of days absent. You may contact me by e-mail to request extending the due date. Students will not receive an incomplete for late work. Students should refer to the course calendar for assignments missed during an absence.

B. *Unexcused absences*: Work missed during an unexcused absence, will not receive credit.

IV. Behavior:

A. Behavior problems, including cheating are subject to discipline in accordance with the Student Code of Conduct.

V. Grade reporting:

A. Student's may review their grades on line. They should contact me immediately if they have any questions about their grades.

Scope & Sequence

1st Semester

I. First Nine Weeks

A. **Unit I: Kinematics (Chps. 1 - 3)**

i. Position, Velocity, and Acceleration
ii. Representations of Motion

B. **Unit II: Dynamics (Chp. 4)**

i. Systems
ii. The Gravitational Field
iii. Contact Forces
iv. Newton's First Law
v. Newton's Third Law and Free-Body Diagrams
vi. Newton's Second Law
vii. Applications of Newton's Second Law

C. **Unit III: Circulation Motion and Gravitation (Chp. 5)**

i. Vector Fields
ii. Fundamental Forces
iii. Gravitational and Electric Forces
iv. Gravitational Field/ Acceleration Due to Gravity on Different Planets
v. Inertial vs. Gravitational Mass
vi. Centripetal Acceleration and Centripetal Force
vii. Free-Body Diagrams for Objects in Uniform Circular Motion
viii. Applications of Circular Motion and Gravitation

a. Special Topic: Special Relativity

II. Second Nine Weeks

A. **Unit IV: Energy (Chp. 6)**

i. Open and Closed Systems: Energy
ii. Work and Mechanical Energy
iii. Conservation of Energy, the Work Energy Principle, and Power

B. **Unit V Momentum (Chp. 7)**

i. Momentum and Impulse
ii. Representations of Changes in Momentum

iii. Open and Closed Systems: Momentum
iv. Conservation of Linear Momentum

C. **Unit VII: Torque and Rotational Motion (Chps. 8 -9)**
i. Rotational Kinematics
ii. Torque and Angular Acceleration
iii. Angular Momentum and Torque
iv. Conservation of Angular Momentum
a. Special Topic: General Relativity

2nd Semester

III. First Nine Weeks

A. **Unit VI Simple Harmonic Motion (Chps. 10, 16-17)**
i. Period of Simple Harmonic Oscillators
ii. Energy of a Simple Harmonic Oscillator
iii. Waves
iv. Periodic Waves

B. **Unit III Electric Force, Field, and Potential (Chps. 18-19)***
i. Electric Systems
ii. Electric Charge
iii. Conservation of Electric Charge
iv. Charge Distribution— Friction, Conduction, and Induction
v. Electric Permittivity
vi. Introduction to Electric Forces
vii. Electric Forces and Free-Body Diagrams
viii. Describing Electric Force
ix. Gravitational and Electromagnetic Forces
x. Vector and Scalar Fields
xi. Electric Charges and Fields
xii. Isolines and Electric Fields
xiii. Conservation of Electric Energy
a. Special Topic: The Standard Model

IV. Second Nine Weeks

A. **Unit IV Electric Circuits (Chps. 20)***

i. Definition and Conservation of Electric Charge
ii. Resistivity and Resistance
iii. Resistance and Capacitance
iv. Kirchhoff's Loop Rule
v. Kirchhoff's Junction Rule and the Conservation of Electric Charge
a. Special Topic: Superconductivity

***The AP Exam does not include topics shown in red.**