



# AP Course Description

## Biology, Chemistry, Environmental and Physics

### **AP Biology**

The course is based on four Big Ideas, which encompass core scientific principles, theories, and processes that cut across traditional boundaries and provide a broad way of thinking about living organisms and biological systems. The following are Big Ideas:

- The process of evolution explains the diversity and unity of life.
- Biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis.
- Living systems store, retrieve, transmit, and respond to information essential to life processes.
- Biological systems interact, and these systems and their interactions possess complex properties.

Reading Requirement: textbook reading required; 2-3 chapters per unit; 6 units per semester

Math Requirement: 4-function; simple algebra; basic statistical analysis; graphical creation and interpretation

Problem Solving: frequent biomechanic/structure function problem solving

Juniors should strongly consider concurrent enrollment in Physics. Check with college admission requirements.

Class Length: 2 class periods

Credits Awarded: 2-hours AP credit (1 AP credit for Biology and 1 AP credit for Advanced Biology Lab)

### **AP Chemistry**

The key concepts and related content that define the AP Chemistry course and exam are organized around underlying principles called the Big Ideas. They encompass core scientific principles, theories, and processes that cut across traditional boundaries and provide a broad way of thinking about the particulate nature of matter underlying the observations students make about the physical world. The following are Big Ideas:

- The chemical elements are the building blocks of matter, which can be understood in terms of the arrangements of atoms.
- Chemical and physical properties of materials can be explained by the structure and the arrangement of atoms, ions, or molecules and the forces between them.
- Changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.
- Rates of chemical reactions are determined by details of the molecular collisions.
- The laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter.
- Bonds or attractions that can be formed can be broken. These two processes are in constant competition, sensitive to initial conditions and external forces or changes.

Reading Requirement: textbook reading required; 1-2 chapters per unit; 8 units per semester

Math Requirement: graphing calculator; daily use of algebra; graphical creation and interpretation; error analysis

Lab Requirement: weekly data collection and analysis using a wide variety of techniques, technical writing

Problem Solving: daily mathematics problem solving; online homework service

Juniors should strongly consider concurrent enrollment in Physics. Check with college admission requirements.

Class Length: 2 class periods

Credits Awarded: 2-hours AP credit (1 AP credit for Chemistry and 1 AP credit for Advanced Chemistry Lab)

### **AP Environmental Science**

Environmental science is interdisciplinary; it embraces a wide variety of topics from different areas of study. There are several unifying themes that cut across topics. The following are course themes:

- Science is a process.
- Energy conversions underlie all ecological processes.
- The Earth itself is one interconnected system.
- Humans alter natural systems.
- Environmental problems have a cultural and social context.
- Human survival depends on developing practices that will achieve sustainable systems.

Reading Requirement: online textbook reading required; 1-2 chapters per unit; 6 units per semester

Math Requirement: simple algebra; dimensional analysis; graphical interpretation

Problem Solving: frequent mathematics problem solving, no calculator permitted

Juniors should strongly consider concurrent enrollment in Physics. Check with college admission requirements.

Class Length: 1 class period

Credits Awarded: 1-hour AP credit

# ATTENTION

Students may **NOT** take both AP Physics 1-2 and AP Physics C.

Student may **NOT** take AP Physics C E&M after completing AP Physics 1-2

## AP Physics 1-2

The AP Physics 1 and 2 courses explore principles of Newtonian mechanics (including rotational motion); work, energy, and power; mechanical waves and sound, optics, fluids, thermodynamics, electrostatics, circuits magnetism and topics in modern physics.

The course is based on several Big Ideas, which encompass core scientific principles, theories, and processes that cut across traditional boundaries and provide a broad way of thinking about the physical world. The following are Big Ideas:

- Objects and systems have properties such as mass and charge. Systems may have internal structure.
- Fields existing in space can be used to explain interactions.
- The interactions of an object with other objects can be described by forces.
- Interactions between systems can result in changes in those systems.
- Changes that occur as a result of interactions are constrained by conservation laws.
- Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a math
- Objects and systems have properties such as mass and charge. Systems may have internal structure.
- Fields existing in space can be used to explain interactions.
- The interactions of an object with other objects can be described by forces.
- Interactions between systems can result in changes in those systems.
- Changes that occur as a result of interactions are constrained by conservation laws.
- 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.
- The mathematics of probability can be used to describe the behavior of complex systems and to interpret the behavior of quantum mechanical systems.

Reading Requirement: online textbook is used as support material; 1-2 chapters per unit; 8 unit per semester

Math Requirement: graphing calculator; uninterrupted math program (recommended **concurrent** enrollment in precalculus); everyday use of algebra & trigonometry; graphical creation and interpretation

Problem Solving: daily mathematics problem solving; online homework service; goal or task oriented lab activities

Class Length: 1 class period

Credits Awarded: 2-hours AP credit

(1 AP credit for AP Physics 1 and 1 AP credit for AP Physics 2)

## AP Physics C

The Physics C course covers mechanics and electricity & magnetism and is equivalent to a one-year, calculus-based, college-level physics. Calculus is integrated into the course at the same pace as learned in the AP Calculus class. It is especially appropriate for students planning to specialize or major in physical science or engineering. The AP Physics C course provides instruction in each of the following content areas:

- Mechanics
  - Kinematics
  - Newton's Laws of Motion
  - Work, energy and power
  - Systems of particles and linear momentum
  - Circular motion and rotation
  - Oscillations and gravitation
- Electricity and Magnetism
  - Electrostatics
  - Electric fields and potential
  - Electric circuits
  - Magnetic fields
  - Electromagnetism

Reading Requirement: online textbook is used as support material; 1-2 chapters per unit; 6 unit per semester

Math Requirement: graphing calculator; **concurrent** enrollment in either calculus AB or BC; everyday use of algebra & trigonometry; everyday use of calculus by the end of the course.; graphical creation and interpretation

Problem Solving: daily mathematics problem solving; online homework service; goal or task oriented lab activities

Class Length: 1 class period

Credits Awarded: 2-hours AP credit

(1 AP credit for AP Physics C Mechanics and 1 AP credit for AP Physics C Electricity and Magnetism)