

Department: Science

Course Name: Advanced Placement Biology

Course Description:

AP Biology is a comprehensive survey course for science majors with accompanying laboratory sections. Biological concepts and processes are emphasized in lecture, laboratory investigations and class discussions. AP Biology is arranged around four main ideas: evolution drives diversity and unity of life; biological systems use free energy to maintain homeostasis; living systems store, transmit, and respond to information essential to life; and biological systems interact and these interactions have complex properties. Biological interactions and biological transformations of free energy are taught in first semester. Second semester addresses how living systems store and respond to information essential to life and evolution. Science practices are incorporated in all content. Science practices include the ability to produce and use models (both physical and computer generated), application of mathematics to understanding data (including some statistical analysis), students guiding their own investigations with scientific questioning, student collection and interpretation of data, working with scientific explanations and theories, and using connections and concepts across domains. Prerequisites for this course include chemistry and an introduction to biology course. Grades in both classes should be B+ or better. AP Biology students complete a minimum of 12 major lab reports and several projects during the course. This course requires a double block to ensure sufficient lab time.

Content:

Scientific method-inquiry labs; design their own labs
Basic carbon chemistry; water properties; pH
Macromolecules-structure, bonding, function
Cell structure/function from molecular level
Metabolism-thermodynamics; enzymes
Chromosomal basis of inheritance
Molecular basis of inheritance
DNA replication and translation
Regulation of gene expression
Viruses; viral inheritance patterns
Biotechnology-recombinant DNA
Biomes and general ecology
Population/community ecology
Restoration ecology
Ethology
Phylogeny bacteria, protists, plant colonization, animal development
Fungi
Invertebrates and vertebrates
Evolution of genomes
Evolution of populations
Origin of species
Plant structure and growth
Plant resource acquisition and transport
Plant responses to internal and external signals
Animal nutrition
Animal circulation and gas exchange
Immune system

Osmoregulation and excretion
Animal reproduction
Nervous system
Sensory and motor systems

Skills:

Utilize a learning management system for accessing content, assignments, and assignment submissions.
Collect data using basic college field methods.
Analyze data using statistical tests, by hand or with a statistical application.
Graph or chart data in spreadsheets.
Utilize a variety of lab techniques.
Use microscopes of different kinds for different purposes.
Identify variables, create methods, analyze and draw conclusions from student designed Experiments.
Organize information to create flow charts or other graphic representations.

Methods of Instruction:

Project based learning, synchronous and asynchronous in a sharing application
Class discussion with emphasis on integrating and analyzing data
Laboratory experiments-emphasis on inquiry based laboratory experiences
Data analysis with computer graphing and computer apps for statistical analysis
Lecture with focus on developing critical thinking skills utilizing Google Slides
Demonstrations illustrating methods of experimentation
Computer simulations in Excel
Collaboration with Google documents

Methods of Evaluation:

Laboratory reports
Critical thinking essays
Tests, either on paper or with online assessment applications
Quizzes, either on paper or with online assessment applications
Models and other graphic representations