Syllabus: AP Biology v13

Below is the syllabus for your course.

Estimated Completion Time: This AP Biology course is scheduled for 2 semesters, completed within 32-36 weeks at the traditional pace.

Description:

This challenging course is designed to provide a college-level experience and prepare students for the AP exam in early May. Over two semesters, the students are engaged in a wide variety of activities, with substantial emphasis on interpreting and collecting data in virtual labs, writing analytical essays and mastering Biology concepts and connections. The key themes of the AP Biology course are: the scientific processes, the affects of science on technology and society, the chemistry and make up of living organisms, genetics, diversity, and evolution.

Throughout this course you will be expected to answer questions, reflect on issues and complete lab activities. The primary emphasis is to develop an understanding of concepts rather than memorizing terms and technical details. The course will successfully prepare you for the AP Exam in May.

Course Assessment and Participation Requirements:

Besides engaging students in challenging curriculum, this course guides students to reflect on their learning and to evaluate their progress through a variety of assessments. Assessments can be in the form of work files, multiple choice questions, short answer questions, projects, essays, labs, oral assessments, and discussions. Instructors evaluate progress and provide interventions through the variety of assessments built into a course, as well as through contact with the student in other venues.

In addition, the primary emphasis of this course is to develop an understanding of concepts rather than memorizing terms and technical details; with the ultimate goal of preparing students to successfully take the AP Biology examination offered in May.

Segment 1

- Science as a Process
- Relationship of Structure to Function
- Energy Transfer
- Regulation
- Science

- Technology & Society
- Continuity and Change
- Evolution
- Interdependence in Nature
- Scientific Method
- Basic Chemistry
- Organic Chemistry
- Polymerization
- Isomers
- Functional Groups
- Biochemistry
- Properties of Water
- Metabolism
- Enzymes
- Cell Structure and Function
- Cell Processes
- Cell Division
- Cell Research Including Information on Cancer Cells, and Gametogenesis
- Inheritance and Genetics
- Mendel's Work in Genetics
- Statistical Analysis of Genetic Information
- Non-Mendelian Patterns of Inheritance
- Nuclear Processes, Role of DNA and/or RNA in Replication, Transcription and Translation
- Mutations and How These Can Be Seen in Populations
- DNA Technology
- Evolution
- Genetic Drift and Gene Flow
- Mutations in Populations
- Non-Random Mating
- Natural Selection
- Hardy-Weinberg Equilibrium
- Macroevolution

Module 1

This module begins with an exploration of the theories surrounding the origin of life on Earth. Next, the students explore Darwin's theory of natural selection and the evidence that describes evolutionary changes in populations over time. The students continue to study evolutionary changes in populations, speciation, phylogenetic trees, and the use of the Hardy-Weinberg equation.

Module 2

This is a short module that contains the following important biological concepts: chemistry of life, cell structure and function, prokaryotic and eukaryotic cells, cell membrane structure and function, and homeostasis.

Module 3

This module explores:

- The energy requirements of individuals and biological systems
- Energy availability from one trophic level to the next in an ecosystem
- Endothermy and ectothermy
- ATP and ADP molecules
- The reactions, mechanisms and pathways of cellular respiration and photosynthesis

Module 4

This module addresses how:

- Organisms use feedback mechanisms to maintain their internal environments and respond to external environmental changes
- Organisms respond to changes in their external environments
- All levels of biological systems are affected by abiotic and biotic interactions
- Biological systems are affected by disruptions to their dynamic homeostasis
- Organisms use a variety of chemical and physical defenses to fight disruptions to their homeostasis timing and coordination of specific events is important for the normal development of an organism

Segment 2

- Relationship of Structure to Function
- Continuity and Change
- Interdependence in Nature
- Evolution
- Energy Transfer
- Regulation
- Systematics
- Viruses, Bacteria, and Fungi
- Plant Evolution and Diversity
- Alternation of Generations/Plant Life Cycles
- Plant Structure and Function
- Plant Growth and Reproduction

- Plant Nutrients and Hormones
- Photosynthesis
- Phylogeny and Animal Diversity
- Transport in Animal Systems
- Immunology
- Osmoregulation
- Chemical Regulation
- Reproduction and Development
- Nervous System
- Muscular and Skeletal System
- Levels of Organization
- Biotic and Abiotic Factors
- Ecosystems, Populations, and Communities
- Symbiosis, Food Webs, and Keystone Predators
- Biogeochemical Cycles in the Environment

Module 5

This module covers:

- Mitosis
- Meiosis
- Binary fission
- Stages of the cell cycle, regulation of the cell cycle, and cancer
- DNA mutations
- Mendelian genetics and Punnett squares
- Sex-linked inheritance and sex-limited gene expression
- Non-nuclear inheritance
- DNA and RNA structure and function
- DNA replication and base-pairing
- Transcription and Translation
- Gene expression

Module 6

This module explores:

- The various ways in which processes increase genetic variation in organisms
- How viral replication can increase the genetic variation of viruses or affected host organisms
- The variety of intercellular and intracellular signal transmissions that can mediate gene expression

- How cells communicate with each other through direct contact with other cells or from a distance via chemical signaling
- How signal transduction pathways link signal reception with cellular response
- Changes in signal transduction pathways can alter cellular response
- The various ways in which individual organisms can act on received information and communicate it to other organisms
- How nervous systems detect internal and external signals, transmit information, and produce responses.

Module 7

This module explores:

- Biochemistry - The structure of molecules, as well as interactions between molecules, determine their properties and functions.
- Cooperative interactions within organisms, at the cellular and system levels, contribute to the overall functions of the organism and contribute to efficiencies in the use of energy and matter.
- Interactions between biological systems, such as the respiratory and circulatory systems.
- Interactions between populations within a community, and the effects of any population changes on the community as a whole.
- The movement of energy and resources through various ecosystems.

Module 8

This module explores:

- Large scale events that can change the distribution of ecosystems
- Consequences of human impact and environmental events on local and global ecosystems
- The influence of environmental factors on an organism's phenotype
- How species diversity within an ecosystem influences the stability of that ecosystem