



AP BIOLOGY SYLLABUS

Course Overview

Advanced Placement (AP) Biology is a course that is equivalent to a two semesters introductory biology class for science majors in the first year of college. Students will use college-level textbooks and materials to develop a conceptual framework for modern biology. AP students will cover information and topics, develop skills, and complete assignments found in a college level course. By completing AP Biology, students will develop an appreciation of science as a process, grasp concepts rather than memorize them, recognize unifying themes across all biology topics, and apply their knowledge and critical thinking skills to environmental and social issues. Students are expected to maintain an organized binder for the course over the school year as well as keep up with the readings and homework.

Textbook

Losos, Jonathan. Biology.

8th ed. New York:McGraw-Hill Higher Education, 2008.

Olson, Brian. Student Study Guide to accompany Biology.

8th ed. New York:McGraw-Hill Higher Education, 2008.

AP Biology Lab Manual for Students

College Board, 2001

Teaching Strategies

- The major themes emphasized in the course are:
 - I. Science as a Process
 - II. Evolution
 - III. Energy Transfer
 - IV. Continuity and Change
 - V. Relationships of Structure to Function
 - VI. Regulation
 - VII. Interdependence in Nature
 - VIII. Science, Technology and Society
- Materials used to teach these concepts are lecture, PowerPoint, Internet, animations, group discussions, science magazines, newspaper articles, labs, and student presentations.
- Assessments used to check for understanding include quizzes and exams, binders, lab reports, presentations, and essays.

- Students will receive an objective sheet for each section. The objective sheet will contain vocabulary, sample questions (both multiple choice and open-ended), and article reviews focusing on the main concepts of each section.
- Students will be required to create and present Power Point presentations on systems of the human body, plant physiology and development and cellular processes.

Topic Outline

I. Molecules and Cells.....25%

- A. Chemistry of Life.....7%
- B. Cells.....10%
- C. Cellular Energetics.....8%


II. Heredity and Evolution.....25%

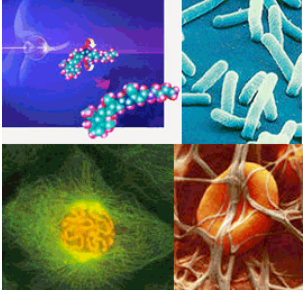
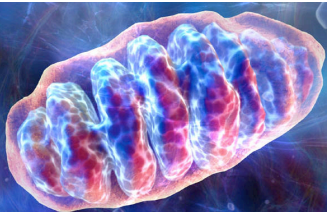

- A. Heredity.....8%
- B. Molecular Genetics.....9%
- C. Evolutionary Biology.....8%



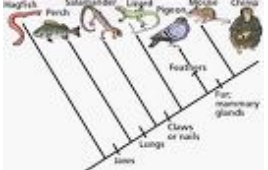

III. Organisms and Populations.....50%


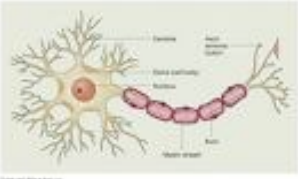
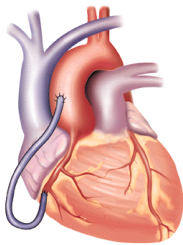

- A. Diversity of Organisms.....8%
- B. Structure and Function of Plants and Animals.....32%
- C. Ecology.....10%


GENERAL OVERVIEW

UNIT	TOPIC TITLE	CONCEPTS	CHAPTERS	AP LABS
I. Molecules and Cells				
A.	Chemistry of Life	The Nature of Molecules <ul style="list-style-type: none"> • Atoms and elements • Molecules and chemical bonding • Water 	Chapter 2	
		The Chemical Building Blocks of Life <ul style="list-style-type: none"> • Carbon • Macromolecules 	Chapter 3	
		Energy and Metabolism <ul style="list-style-type: none"> • Free energy changes • Enzymes • ATP 	Chapter 6	AP Lab 2

B.	Cells 	Cell Structure <ul style="list-style-type: none"> • Cell theory • Prokaryotic and eukaryotic cells • Cell parts and organelles • Subcellular organization 	Chapter 4	
		Membranes/Cell Communication <ul style="list-style-type: none"> • Membranes and transport • Transport and communication 	Chapter 5 and Chapter 9	AP Lab 1
		How Cells Divide <ul style="list-style-type: none"> • Cell cycle and regulation • Interphase, mitosis, and cytokinesis 	Chapter 10	
C.	Cellular Energetics 	How Cells Harvest Energy <ul style="list-style-type: none"> • Respiration • Oxidation-Reduction Reactions • Fermentation 	Chapter 7	AP Lab 5
		Photosynthesis <ul style="list-style-type: none"> • Photosynthesis • Light-dependent reactions • Carbon fixation • Photorespiration 	Chapter 8	AP Lab 4
II. Heredity and Evolution				
A.	Heredity 	Sexual Reproduction and Meiosis <ul style="list-style-type: none"> • Meiosis • Meiosis vs. Mitosis • Gametogenesis 	Chapter 11	AP Lab 3
		Patterns of Inheritance <ul style="list-style-type: none"> • Monohybrid and dihybrid crosses • Probability 	Chapter 12	AP Lab 7
		Chromosomes, Mapping, and the Meiosis-Inheritance Connection <ul style="list-style-type: none"> • Inheritance patterns <ul style="list-style-type: none"> • Sex-linkage • Sex chromosomes • Genetic mapping • Genetic disorders 	Chapter 13	
B.	Molecular Genetics	DNA: The Genetic Material <ul style="list-style-type: none"> • Structure of DNA • DNA Replication 	Chapter 14	
		Genes and How They Work	Chapter 15	

		<ul style="list-style-type: none"> Genetic code Gene expression Transcription RNA Translation Mutation 		
		Control of Gene Expression <ul style="list-style-type: none"> Prokaryotic and eukaryotic regulation 	Chapter 16	
		Viruses <ul style="list-style-type: none"> Viral replication 	Chapter 27	
		Biotechnology/Genomics <ul style="list-style-type: none"> DNA manipulation and analysis Genetic engineering and cloning Medical and agricultural applications 	Chapter 17 and Chapter 18	AP Lab 6
C.	Evolutionary Biology 	Tree of Life <ul style="list-style-type: none"> Early evolution Origins of prokaryotes Origins of eukaryotes 	Chapter 26	
		Evidence of Evolution <ul style="list-style-type: none"> Natural selection and Darwin Fossil evidence Anatomical evidence Convergent evolution 	Chapter 21	
		The Origin of Species <ul style="list-style-type: none"> Reproductive isolation Genetic drift Speciation Extinction Hardy-Weinburg principle 	Chapter 22	AP Lab 8
III. Organisms and Populations				
A.	Diversity of Organisms  	Systematics and the Phylogenetic Revolution/ Tree of Life <ul style="list-style-type: none"> Systematics Cladistics Classification Comparative biology Phylogeny 	Chapter 23 and Chapter 26	
		Genome Evolution <ul style="list-style-type: none"> Comparative genomics Genomes 	Chapter 24	
		Viruses Prokaryotes Protists Overview of Green Plants Fungi	Chapter 27, Chapter 28, Chapter 29, Chapter 30, Chapter 31,	

		Overview of Animal Diversity Noncoelomate Invertebrates Coelomate Invertebrates Vertebrates	Chapter 32, Chapter 33, Chapter 34, Chapter 35	
B.	<p>Structure and Function of Plants and Animals</p>   	Plant Form <ul style="list-style-type: none"> • Roots, stems, and leaves 	Chapter 36	AP Lab 9
		Vegetative Plant Development <ul style="list-style-type: none"> • Embryo development • Seeds, fruits, and germination 	Chapter 37	
		Transport in Plants <ul style="list-style-type: none"> • Xylem • Phloem 	Chapter 38	
		Plant Defense Responses <ul style="list-style-type: none"> • Toxin defenses • Physical defenses • Responses to invaders 	Chapter 40	
		Sensory Systems <ul style="list-style-type: none"> • Behavioral adaptations of plants 	Chapter 41	
		Plant Reproduction <ul style="list-style-type: none"> • Development • Flower production • Pollination and fertilization • Asexual reproduction 	Chapter 42	
		Nervous System Sensory Systems Endocrine System The Musculoskeletal System The Digestive System The Circulatory and Respiratory Systems Temperature, Osmotic Regulation and the Urinary System The Immune System The Reproductive System Animal Development Behavioral Biology	Chapter 44, Chapter 45, Chapter 46, Chapter 47, Chapter 48, Chapter 49, Chapter 50, Chapter 51, Chapter 52, Chapter 53, Chapter 54	AP Lab 10 AP Lab 11
C.	<p>Ecology</p> 	Population Ecology <ul style="list-style-type: none"> • Species • Demographics and dynamics • Population growth and limiting factors • Factors that regulate populations 	Chapter 55	
		Community Ecology <ul style="list-style-type: none"> • Ecological niches • Predator-prey 	Chapter 56	

	relationships		
	<ul style="list-style-type: none"> Species interactions 		
	Dynamics of Ecosystems <ul style="list-style-type: none"> Flow of energy Biodiversity Trophic levels Ecosystem stability 	Chapter 57	AP Lab 12
	Biosphere <ul style="list-style-type: none"> Biomes and habitats Human impacts and global warming Global issues 	Chapter 58	

Lab Component

Students will carry out twelve college-level laboratory experiments using the AP Biology Lab Manual for Students. In AP Biology, students will be required to write full lab reports. During laboratories, they will develop skills such as detailed observations, accurate reporting, experimental design, data interpretation, analysis, and experience with lab equipment. This portion of the course will count for twenty-five percent of the grade. Some labs may require time spent after school or during winter break.

List of Labs

- Lab 1: Diffusion and Osmosis
- Lab 2: Enzyme Catalysis
- Lab 3: Mitosis and Meiosis
- Lab 4: Plant Pigments and Photosynthesis
- Lab 5: Cell Respiration
- Lab 6: Molecular Biology
- Lab 7: Genetics of Organisms
- Lab 8: Population Genetics and Evolution
- Lab 9: Transpiration
- Lab 10: Physiology of the Circulatory System
- Lab 11: Animal Behavior
- Lab 12: Dissolved Oxygen and Primary Productivity

