

AP Biology Syllabus

Course Overview

We meet 4 class periods a week for 50 minutes. There are 11 scheduled Saturday labs and tutorials, which last approximately 4 hours. Shorter labs take place during class, while longer labs are saved for Saturdays. Twenty-five percent of the class is devoted to performing and discussing labs.

My AP Biology class conforms to the standards set forth by the College Board and covers all of the topics in the AP Biology Course Description. These include biochemistry, cell structure and function, metabolism, genetics, molecular basis of inheritance, DNA technology, evolution, microbiology, classification, plants, animals, animal physiology, and ecology. The **eight major themes**; energy transfer, continuity and change, structure and function, regulation, interdependence, and science technology and nature, are emphasized in each unit as a means to unify the concepts.

The textbook for the course is the 7th edition of Neil A Campbell and Jane B Reece's *Biology*. Pearson/Benjamin Cummings 2005

Students also use The College Board AP Biology Lab Manual(2001), which incorporates the 12 AP Biology recommended labs.

Cliff's AP Biology is the study guide used throughout our review for the AP exam.

We also use various power-point presentations and web-based Biology Animations throughout each unit. We also use many computer simulations for various topics such as meiosis, photosynthesis, and genetics. I provide lecture outlines for each student, which summarize the major concepts in each unit. Furthermore, I present students with my power-point presentations for at home review.

Field Trips

1. The Gibbon Center in Santa Clarita, California
 - a. Here we study primate behavior, taxonomy, the effects of deforestation on natural habitat, and ecosystems
2. The Long Beach Aquarium- Aquacology and Dissolved Oxygen Lab (#12)
3. USC Norris Theater- "Flock of Dodos"- Screening and panel
4. Chaparral Camping Trip

Research Papers/Presentations

Signal Transduction Pathways

Environmental ethics

Genetic Disorders Project

Creative Evolution Paper

Plant Biology Project

More Course Reading- excerpts from the following
Genome (Matt Ridley)

Oxygen, The molecule that made the world (Nick Lane)
Power, Sex, Suicide; Mitochondria and the Meaning of life. (Nick Lane)
 Dr. Tatianas Sex advice to all Creation (Olivia Judson)
 The Red Queen, Matt Ridley

Course Outline

Unit	Lecture and Lab Topics	Reading (Campbell)	Labs
1 (3 weeks)	<p>A. Chemistry of Life</p> <ul style="list-style-type: none"> -Structure of an atom -Types of chemical bonding -Functional groups -Macromolecules -Enzymes -Water <p>B. Cell structure and Function</p> <p>Major questions: What are the different types of cells found in living organisms? What are the anabolic and catabolic processes in each cell and how are they maintained?</p>	Chapters 2,3, 4, 5,6	AP Lab #2: Enzymes (Student Conducted) (3-4 hours)
2 (3 weeks)	<p>A. Fluid Mosaic Model of the plasma membrane</p> <ul style="list-style-type: none"> -movement of substances <p>B. Cell Communication</p> <p>C. Cellular reproduction</p> <ul style="list-style-type: none"> -mitosis - cell cycle <p>Major question: What is the cell theory and how does it relate to the continuity of life? What happens when the cell cycle is disrupted?</p>	Chapter 7,11,12	<p>AP Lab #1: Diffusion/ Osmosis (Student Conducted) (2-3 hours)</p> <p>AP Lab #3: Mitosis/Meiosis (Student Conducted) (4 hours)</p>
3 (2 weeks)	<p>A. Metabolism</p> <ul style="list-style-type: none"> -Free energy changes -molecules and reactions involved in metabolism -fermentaion and cellular respiration -Photosynthesis 	Chapters 8,9,10	<p>AP Lab #5: Cell Respiration (Student conducted) (3-4 hours)</p> <p>AP Lab #4: Photosynthesis and</p>

	<p>Major Question: How do organisms maintain homeostasis? How do the various modes of energy production compare in different organisms?</p>		Plant Pigments (Student Conducted) (3 hours)
<p>4 (1.5 weeks)</p>	<p>A. Genetics -Meiosis -Mendelian Genetics Inheritance patterns: monohybrid and dihybrid crosses, sex-linked, codominance, incomplete dominance, probability -Chromosomal Basis of inheritance</p> <p>Major Question: What are the major patterns of inheritance?</p>	Chapters 13,14,15	AP Lab #7: Genetics of Organisms (Student Conducted) (8-10 hours over the course of the month) Lab: Virtual Fly Lab (Virtual- Student Led) (1 hour)
<p>5 (4 weeks)</p>	<p>A. Molecular Genetics -structure of prokaryotic and eukaryotic chromosomes -transcription -translation</p> <p>B. The Genetics of Viruses and Bacteria -mutation, genetic recombination -viruses in plants and animals -operons -negative and positive gene regulation</p> <p>C. Eukaryotic Genomes -chromatin structure -DNA packing</p> <p>D. DNA technology and Genomics -DNA cloning -RFLP analysis</p> <p>Major questions: Why is DNA considered a universal code? How does our understanding of molecular genetics lend itself to the study of evolution?</p>	Chapter 16,17,18, 19,20	<p>Lab: Electrophoresis of Dyes (2 hours)</p> <p>AP Lab #6: Molecular Biology (Student Conducted) (3-4 hours)</p> <p>Lab: DNA extraction from a Banana. (1 hour)</p>
<p>6 (2 weeks)</p>	<p>A. Evolution -Darwinian view of life -population genetics -speciation -phylogeny -Origin of Earth/ early life</p>	Chapter 22,23,24,25, 26	AP Lab #8: Population genetics and Evolution (Student Conducted) (2.5 hours)

	<p>-Evidence of evolution -Taxonomy</p> <p>Major questions: How does evolutionary theory help explain the history and diversity of life on earth? How do microevolution and macroevolution take place?</p>		<p>Lab: Chi-square lab with M and Ms (Student Conducted) (1 hour)</p> <p>Lab: Cranium Fossil Comparison (1 hour)</p>
<p>7 (8 weeks)</p>	<p>A. Animal form and function -nutrition/digestive system -circulation and gas exchange -immunity -osmoregulation and excretion -hormones and the endocrine system -animal reproduction -animal development -nervous system -sensory and motor mechanisms</p> <p>Guest Speakers: Reproductive endocrinologist Dr. Hal Danzer and embryologist Dr. David Hill</p> <p>Major questions: How are the different body systems dependent on one another? What are the common life processes seen in other animals?</p>	<p>Chapter 40,41,42, 43,44,45,46, 47,48,49,</p>	<p>AP Lab #10: Physiology of the circulatory system (Student Conducted) (2-3 hours)</p> <p>Lab:Calf Heart Dissection (Student Conducted) (1 hour)</p> <p>Lab:Sheep Brain Dissection (Student Conducted) (1 hour)</p>
<p>8 (2 weeks)</p>	<p>A. Plant form and function -growth, structure and development -transport -plant nutrition -nitrogen cycle -carbon cycle -gymnosperms -angiosperms -plant signaling/response to stimuli -alternation of generations</p> <p>Major questions: What are the different reproductive strategies utilized by plants? What adaptive features have contributed to the success of plants on land?</p>	<p>Chapters 35, 36, 37, 38, 39</p>	<p>AP Lab #9: Transpiration (Student Conducted) (3 hours)</p> <p>Lab: Flower and Fruit Dissection (1 hour)</p> <p>Lab: Student Presentations on plants. Several labeled plant specimens required of each student. (1-2 hours)</p>
<p>9</p>	<p>A. Diversity of Life</p>	<p>Chapters</p>	<p>Lab:Dissection of</p>

<p>(2 weeks)</p>	<ul style="list-style-type: none"> -prokaryotes -protsts -plant evolution -fungi -animal diversity -invertebrates -vertebrates <p>Major questions: What is the evolutionary relationship between prokaryotes and eukaryotes? What are the distinguishing characteristics of each group?</p>	<p>27,28, 29,30,31,32, 33, 34</p>	<p>an Earthworm (Student Conducted) (1 hour)</p> <p>Lab: Examining Protists (Euglena, paramecium, amoeba, and Volvox.) (student conducted) (1 hour)</p> <p>Lab: Examining Fungi. (Basidiomycota, Ascomycota, Zygomycota) (student conducted) (1 hour)</p>
<p>10 (1.5 weeks)</p>	<p>A. Ecology</p> <ul style="list-style-type: none"> -interactions in the environment between organisms -behavior -populations -communities -ecosystems -biodiversity crisis -sustainable development <p>Major Question: How are humans affecting the earth and the other species on earth?</p>	<p>Chapters 50,51,52,53, 54, 55</p>	<p>AP Lab #12: Dissolved Oxygen Lab and Primary Productivity (Student Conducted) (4 hours)</p> <p>Aquacology Lab (Long Beach Aquarium) (Student Conducted) (2 hours)</p> <p>Lab: Courtship and Copulation: Mating in Nassonia (Student Conducted) (2 hours)</p> <p>Chaparral Field Study –3 day camping trip in San Diego (Student Conducted-sample collections etc.) (5-6 hours over the course of three</p>

			days)
11 (1 week)	Review For AP exam May 14	Cliff's Practice AP exams	
12 (2 weeks)	Ethics in Biology – After the AP Environmental and Medical ethics	Research Paper and Presentation	
13 (1 week)	Science and Literature Current Events/Science Times	Various books, the NY science times, Health section of the LA times, Internet articles	

Student Evaluation

Students are evaluated on their performance on the unit exams, essays, labs, homework, quizzes, and projects. Their final grade depends on the total points earned in each category.

Assignment	Points	Percentage of Grade
Unit exams and final exams	100	60%
Quizzes	25	15%
Labs	20	10%
Homework and Projects	5-20	10%
Essays	25	5%

Tests are given in an AP style format. There are usually 40 multiple-choice questions and one to two essays.

Quizzes are given every other week. They are multiple choice and short answer.

Essays are assigned almost every night. The essays are thematic and are a means to unify concepts throughout the curriculum.

Lab Component

Labs are conducted weekly. They comprise at least 25% of the curriculum. The emphasis is placed on developing and testing a hypothesis, collection of data, making accurate observations, analyzing results, explaining the theories involved, and connecting the lab to the course content and major themes in biology. Each student completes a lab write up after each lab, which includes their observations, answers to several questions, a conclusion, and a discussion of the theories involved.

After the AP

I use this time to really connect and unify all of the topics we have covered throughout the year. Each student writes and presents a research paper on a biomedical ethics issue or an environmental ethics issue. We have group discussions about each student's paper. The students are able to fully appreciate how much their knowledge of science can have an impact on the decisions they make. Each student will be voting for candidates in upcoming elections. After AP Biology, they will be fully informed about the issues they may be voting on, such as stem cell research, assisted reproductive technologies, global warming, the energy crisis, and gene therapy.