



Welcome

AP Biology Syllabus

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Course Overview

Welcome to a successful year of AP Biology. I am excited about the time that we will spend together learning about ourselves and the intricacies of the world that we live in. This course orients around eight themes that are pivotal to our understanding of biology: **science as a process, evolution, energy transfer, continuity and change, structure to function relationships, regulation, interdependence in nature, and science/technology/society.** Embedded within these eight themes is insight into social and environmental concerns. AP Biology is a double period class that meets every day for 90 minutes. For every class period we spend together you will average that same amount of time in homework.

Weekly Class Structure

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Homework Due	Assessment Day Submit Chapter Notes & Review packet	Reading from <i>Campbell Biology</i>	Pre-lab Questions	Pre-lab Questions	Lab Analysis Questions from <i>Biology Lab Manual</i>	Saturday School begins at 8:30AM and lasts until 11:00AM Registration required Work on labs, notes, and review packets Medical student mentor meet in small group to assist with review packets
Warm-up	Pre-Reading Activity	Building understanding current reading	Pre-Lab/Project Activator	Pre-Lab/Project Activator	Community Building Activity	
Lesson	Whole Class – Model During Reading Strategy	Direct Instruction	Review Procedures	Review Procedures	Direct Instruction	
Work Period	Small Group Reading using Strategy		LAB/PROJECT	LAB/PROJECT	Group Work	
Closing	Post Reading Activity	Exit Ticket	Lab/Project Discussion Summarizer	Lab/Project Discussion Summarizer	Vocabulary & Random Pick	
Homework Assigned <i>*write in agenda</i>	Chapter Notes for <i>Campbell Biology</i>	Pre-lab Questions and Review Packets for each chapter	Lab Analysis Questions from <i>Biology Lab Manual</i>	Lab Analysis Questions from <i>Biology Lab Manual</i>	Reading from <i>Campbell Biology</i>	

Responsibility – What is expected of me in AP

- 100% Effective effort will lead to success... Attend class everyday & check edline frequently
- Be on time for class. That means you are seated, with materials, and working on the warm-up before the late bell rings. If you should arrive tardy, sign your name to the tardy sheet near the door and attach your pass. *Three unexcused tardies will count as one unexcused absence.*
- Hats, cell phones, and electronic devices must be OFF and out of sight.
- Food or drinks, other than bottled water, are not allowed in the classroom. (be responsible for cleaning-up after yourself)
- Set goals for yourself and ask for support from your peers and teacher and adhere to class NORMS

Materials – What should I bring to AP Biology class?

- 2 inch binder and notebook paper
- Spiral notebook or composition book
- Ruler and calculator
- Pencil, pen, glue stick, and colored pencils



Texts: Each student will receive two textbooks:

Campbell, Neil A., Jane B. Reece, and L. Mitchell. *Biology*. 2007 and Campbell, Neil and Jane B. Reece. *Biology: Concepts and Connections*. 5th ed. 2006. Students will read *Mountains Beyond Mountains* by Tracy Kidder. **Concepts and Connections and Biology 8th Ed. can be left at home and Biology 8th should always be available @ desk.**

Lab Manual: *AP Biology Lab Manual* will be given as each lab approaches.

Test Prep: The Princeton Review (or others) *Cracking the AP Biology Exam*.

Assessment – How will I be graded in AP Biology?

- 1) Each assignment will have a **due date** and a **deadline date**. Any student, who turns in his /her work after the due date, will be penalized one letter grade. Assignments will not be accepted after the **deadline date**. All assignments are found on the weekly schedule.
- 2) Cheating will not be tolerated. Plagiarism is cheating! Students will receive a score of **zero** for any assignment in which in the student has cheated.
- 3) All tests will be announced. Quizzes may be announced or unannounced. Some quizzes may be re-taken once a student has shown that he/she has mastered the indicator. Unit exams or final exams will never be retaken.
- 4) Grades are posted on the web. Progress reports will be issued at three week intervals. Students are expected to keep all returned papers. In case of a grade discrepancy, the burden of proof rests entirely on the student! Keep all papers!
- 5) Students who fulfill the requirements of an assignment or exam will not receive any grade lower than 50%. However, students who do not complete the assignment will receive a zero and may not have the opportunity for a re-take or re-assessment.
- 6) Make-up Policy If you are absent, it is up to **you** to get the work and the assignments you have missed. The agenda for each class and the distributed materials are located in the catch-up center. For excused absences, you will have as many days to make up this work as the days that you missed.

Summative Assessments

50%

- Tests
- Experimentation and Lab Analysis
- Free Responses

Formative Assessments

40%

- Pre-Lab Questions
- Quizzes (random pick or scheduled)
- Notebook

Homework

10%

- Chapter Notes and Reviews

Grading Scale

100 - 90 = A
 89 - 80 = B
 79 - 70 = C
 69 - 60 = D
 59-0 = E

The to in AP Biology

	Societal/Environmental Connections	Content Outline	Themes	Biology 5 th Ed.
Unit I Cell Biology 3 weeks	<p>Students debate the issues surrounding stem cell research to answer the questions...</p> <ul style="list-style-type: none"> Can we cure disease with embryonic stem cells? Should we cure diseases with embryonic stem cells? <p>Students connect cell function to inheritance and health concerns.</p> <ul style="list-style-type: none"> How is receptor-mediated endocytosis related to high cholesterol? What are the physiological affects of having high cholesterol? 	I. Prokaryotic Cells II. Eukaryotic Cells <ul style="list-style-type: none"> Nucleus and ribosomes Endomembrane System Mitochondria and Chloroplast Peroxisomes Cytoskeleton III. Membrane Structure and Function <ul style="list-style-type: none"> Fluid Mosaic Model IV. Traffic Across Membranes <ul style="list-style-type: none"> Diffusion Osmosis Passive Transport Active Transport Ion pumps V. Transport of large molecules VI. Polarity of Water <ul style="list-style-type: none"> Hydrogen bonding Cohesion VII. Dissociation of Water <ul style="list-style-type: none"> Sensitivity to pH 	<p>Science as a Process – Microscopy lead to understanding of cell structure.</p> <p>Evolution – Endosymbiosis suggests the connection between prokaryotic and eukaryotic origins.</p> <p>Structure to Function Relationships – Membrane structure is specific to transport (active/passive)</p> <p>Regulation – Organisms regulate their internal environments through osmoregulation and excretion.</p>	Chapter 7 Tour of the Cell Chapter 8 Membrane Structure and Function Chapter 3 Water's Polarity Lab AP Lab #1 Osmosis and Diffusion
	Unit II Macromolecules 1 week	<p>Students will build the hemo-globin protein.</p> <ul style="list-style-type: none"> How does protein conformation affect function? How does tertiary structure determine conformation? <p>Students will build the DNA molecule.</p> <ul style="list-style-type: none"> What are the molecules involved in a nucleotide? Why is DNA referred to as “anti-parallel”? 	I. Polymers <ul style="list-style-type: none"> Structure Function Synthesis and Breakdown II. Carbohydrates <ul style="list-style-type: none"> Sugar polysaccharides III. Lipids <ul style="list-style-type: none"> Phospholipids bilayer Steroids IV. Proteins <ul style="list-style-type: none"> Amino acids Enzymes V. Nucleic Acids <ul style="list-style-type: none"> Nucleotide DNA and RNA 	<p>Structure to Function Relationships – Dehydration synthesis and hydrolysis allow for the assembling or disassembling of molecules.</p>

<p>Unit III Enzymes 1 week</p>	<p>Students will trace food through the digestive system and describe how each macromolecule is digested.</p> <ul style="list-style-type: none"> How do digestive enzymes breakdown macromolecules? What affects does the absence of digestive enzymes have on an individual (ie. lactose intolerance)? 	<p>I. Metabolism a. Pathways i. Anabolic ii. Catabolic b. Energy iii. Thermodynamics iv. ATP</p> <p>II. Enzymes a. Activation energy b. Substrate specific c. Factors affecting activity</p> <p>III. Metabolic Control a. allosteric regulation</p>	<p>Structure to Function Relationships – Enzyme and substrate create an induced fit.</p> <p>Energy Transfer – The relationship between anabolic (photosynthesis) and catabolic (cellular respiration) pathways.</p>	<p>Chapter 41 Animal Nutrition</p> <p>Chapter 6 Metabolism and Enzymes</p> <p>Lab</p> <p>AP Lab #2 Enzyme Catalysis</p>
<p>Unit IV Cellular Energetics 3 weeks</p>	<p>How do photosynthesis and respiration play a role in global warming?</p> <ul style="list-style-type: none"> How do the light reactions and Calvin Cycle work together in photosynthesis? How do glycolysis, the Krebs Cycle, and electron transport work together in cellular respiration? 	<p>I. Leaf Anatomy a. Chloroplast structure and function</p> <p>II. Light Reactions a. Electromagnetic spectrum b. Chlorophyll a and b c. chemiosmosis</p> <p>III. Calvin Cycle a. CO₂ to sugar</p> <p>IV. C₄ Plants</p> <p>V. CAM Plants</p> <p>VI. Catabolic Pathways a. Glycolysis b. Krebs Cycle c. Electron Transport</p>	<p>Energy Transfer – Calvin cycle is dependent on ATP from light reactions. The electron transport chain creates a H⁺ gradient needed for the manufacturing of ATP through chemiosmosis.</p>	<p>Chapter 10 Photosynthesis</p> <p>Chapter 9 Cellular Respiration</p> <p>Lab</p> <p>AP Lab #4 Plant Pigments and Photosynthesis</p> <p>AP Lab #5 Cell Respiration</p>
<p>Unit V and Regulation weeks</p>	<p>Students review 2 cancer studies currently being conducted at National Institutes of Health (NIH) and identify the components of the experiment (hypothesis, IV, DV, control group, experimental groups, data collection procedures).</p>	<p>I. Roles of Cell Division b. Growth and repair c. Distribution of chromosomes</p> <p>II. Mitotic Cell Cycle a. Interphase b. Mitosis c. Cytokinesis</p> <p>III. Cell Cycle Regulation a. Control system b. Internal and external cues c. Cancer</p> <p>IV. Introduction to Heredity a. Inherit genes on chromosomes b. Compare sexual and asexual reproduction</p> <p>V. Role of Meiosis in Sexual Life Cycles.</p> <p>VI. Origins of Genetic Variation a. independent assortment</p>	<p>Continuity and change – Compare the genetic variability that results from meiosis and the genetic consistency of asexual reproduction.</p>	<p>Chapter 12 Cell Cycle</p> <p>Chapter 13 Meiosis</p> <p>Lab</p> <p>AP Lab 3# Mitosis and Meiosis</p>

<p>Unit VI Heredity 2 weeks</p>	<p>Students will analyze pedigrees and determine the mode of inheritance as well as phenotypes and genotypes for unknown individuals.</p> <p>Students will examine case studies of individuals who are considering testing for inherited conditions.</p> <ul style="list-style-type: none"> Should genetic testing be performed when no treatment is available? Should children be tested for susceptibility to adult-onset diseases? How does the environment influence the genes? 	<p>I. Mendel and The Gene Idea</p> <ol style="list-style-type: none"> Law of Segregation Law of Independent Assortment Punnett Squares and probability of inheritance <p>II. The Chromosomal Basis of Inheritance</p> <ol style="list-style-type: none"> Recombination Frequency Cytological Maps Gene Linkage <p>III. Chromosomal Abnormalities through nondisjunction</p> <ol style="list-style-type: none"> Down Syndrome Klinefelter <p>IV. Alteration of Chromosome Structure</p> <ol style="list-style-type: none"> deletion duplication inversion translocation 	<p>Science as a Process – Discovery of DNA as genetic material through process of experimentation (Griffith, Hershey-Chase).</p>	<p>Chapter 14 Mendel and the Gene Idea</p> <p>Chapter 15 The Chromosomal Basis of Inheritance</p> <p style="text-align: center;">Lab</p> <p>AP Lab #7 Genetics of Organisms</p>
<p>Unit VII Molecular Genetics 3 weeks</p>	<p>Students will take on the role of crime scene investigators compare the DNA of fictional suspects to the DNA found at a crime scene. Using restriction analysis and gel electrophoresis, students will link one suspect to the crime scene.</p> <ul style="list-style-type: none"> How are genes transcribed and translated into functional proteins? What is the function of gel electrophoresis? <p>Students will examine some of the ethical, legal and social issues that surround the Human Genome Project.</p> <p>Students will complete a service learning project by the year's end to raise money and awareness to better Haitian and Rwandan Healthcare.</p>	<p>I. Molecular Basis of Heredity</p> <ol style="list-style-type: none"> Hershey and Chase Watson and Crick Mendelson and Stahl <p>II. DNA Replication</p> <ol style="list-style-type: none"> leading and lagging strand telomerase primase <p>II. Gene Expression</p> <ol style="list-style-type: none"> transcription translation <p>III. Viruses</p> <ol style="list-style-type: none"> structure infection <p>III. Bacteria</p> <ol style="list-style-type: none"> replication transformation operons <p>IV. Restriction Enzymes</p> <ol style="list-style-type: none"> cutting sites recombination 	<p>Continuity and Change – The process of DNA replication, transcription and translation ensures protein products correspond to DNA sequence. Random changes in the DNA can alter the protein product.</p> <p>Structure to Function relationships – The mRNA codon matches the anticodon of the t-RNA that carries the amino acid.</p> <p>Science as a Process – Human Genome Project</p>	<p>Chapter 16 The Molecular Basis of Inheritance</p> <p>Chapter 17 From Gene to Protein</p> <p>Chapter 18 Microbial Models: The Genetics of Viruses and Bacteria</p> <p>Mountains Beyond Mountains</p> <p style="text-align: center;">Lab</p> <p>AP Lab #6 Bacterial Transformation and Electrophoresis</p>

<p style="text-align: center;">Unit VIII Evolutionary Biology 3 weeks</p>	<p>Student look at the role of climatic change in the evolution of mammals. Students will create phylogenetic trees for each species of mammal using DNA evidence.</p> <p>Students will use a case study about lizards to explain how ecological changes are the driving force behind evolutionary diversification.</p>	<ul style="list-style-type: none"> I. Hardy-Weinberg Equilibrium <ul style="list-style-type: none"> a. allele and genotype frequencies b. factors of microevolution II. Natural Selection <ul style="list-style-type: none"> a. genetic variation <ul style="list-style-type: none"> i. mutation ii. diploidy and balanced polymorphism b. types of selection III. Defining Species <ul style="list-style-type: none"> a. Pre and post zygotic barriers b. Biological species concept IV. Modes of Speciation <ul style="list-style-type: none"> a. allopatric b. sympatric IV. Phylogeny and Systematics 	<p>Science as a Process – Discoveries of Charles Darwin aboard the <i>HMS Beagle</i> lead to natural selection as the means for evolution.</p> <p>Evolution – Microevolution leading to speciation.</p> <p>Interdependence in Nature – The environment determines what variations will increase the fitness of a population.</p>	<p>Chapter 22 Descent with Modification</p> <p>Chapter 23 The Evolution of Populations</p> <p>Chapter 25 Tracing Phylogeny</p>
				Lab
				<p>AP Lab #8 Population Genetics and Evolution</p>

Unit IX Taxonomy 1 week	<ul style="list-style-type: none"> What are the defining characteristics of each kingdom of life? 	I. Kingdoms <ul style="list-style-type: none"> distinguishing characteristics evolutionary relationships and adaptations II. Distinguish between major phyla of each kingdom <ul style="list-style-type: none"> examples of representative organisms 	Evolution – diversity of life on earth is a result of gradual change	Chapters 26-39
				Project
				Survey of the Diversity of Life
Unit X Ecology 3 weeks	<p>Students use National Geographic <i>Strange Days on Planet Earth</i> to look at the role of predators in ecosystem stability in Yellowstone National Park and the Caribbean Coral Reefs.</p> <p>Students look at the impact of non-native species on ecological stability in aquatic environments that include the Chesapeake Bay and Lake Victoria.</p>	I. Behavioral Biology <ul style="list-style-type: none"> learned behavior cognitive ethology <ul style="list-style-type: none"> kinesis taxis competitive social behaviors II. Population Ecology <ul style="list-style-type: none"> Growth models Limiting Factors III. Community Ecology <ul style="list-style-type: none"> Symbiotic Relationships Interspecific Interactions Disturbance IV. Ecosystems <ul style="list-style-type: none"> Trophic Levels Flow of energy <ul style="list-style-type: none"> primary productivity secondary productivity Cycling of Chemical Elements 	Interdependence in Nature – symbiotic relationships Energy transfer – transfer of energy between tropic levels	Chapters 50 Introduction to Ecology
				Chapter 51 Behavioral Biology
				Chapter 52 Population Ecology
				Chapter 53 Community Ecology
				Chapter 54 Ecosystems
Lab				
Lab #11 Animal Behavior				
Lab #12 Dissolved Oxygen				
Unit XI Plants 3 weeks	<p>Students will rotate through work stations to examine living examples and analyze plant morphology, anatomy, transport, control systems, and seeds.</p> <p>Students look at symbiotic relationships between plants and animals and how those relationships have evolved.</p>	I. Structure <ul style="list-style-type: none"> organization of plant tissue plant growth II. Transport of water and nutrients <ul style="list-style-type: none"> xylem and phloem transpiration III. Reproduction <ul style="list-style-type: none"> sexual <ul style="list-style-type: none"> sporophyte and gametophyte pollination asexual <ul style="list-style-type: none"> vegetative propagation 	Structure to Function Relationships – Root structure aids in the absorption of gases and minerals.	Chapter 35 Plant Structure and Growth
				Chapter 36 Transport in Plants
				Chapter 37 Reproduction
				Lab
Lab #9 Transpiration				

<p style="text-align: center;">Unit XII Structure and Function of Animals 4 weeks</p>	<p>Teacher supplies students with a choice of 10 different articles taken from science magazines that look at new physiological discoveries that impact health.</p>	<p>I. Digestive System a. animal bioenergetics b. nutritional requirements i. vitamins ii. minerals c. anatomy of human digestive system d. enzymes involved in digestion II. Circulatory and Respiratory Systems a. open and closed circulatory systems b. heart structure and function i. arteries, veins, capillaries ii. blood pressure and heart rate iii. disease c. marine respiration i. ventilation ii. countercurrent exchange d. terrestrial respiration i. tracheal systems ii. lungs III. Immune System a. Body's Line of Defense b. Immunity to Disease i. lymphocytes ii. humoral and cell-mediated c. AIDS IV. Internal Environment a. thermoregulation i. endo- and ecto-thermy ii. adjustments to body temperature b. water balance c. waste disposal i. comparison among animals ii. nephron V. Homeostasis and the Endocrine System a. major glands and hormones b. feedback mechanisms VI. Reproductive System a. embryonic basis for evolution b. mechanisms for reproduction IV. Nervous System a. anatomy of the neuron b. action potential i. sodium-potassium pump ii. resting membrane potential iii. threshold c. organization of nervous systems d. brain structure and function V. Embryological Development a. mechanisms of reproduction b. mammalian reproduction i. production of the gametes ii. menstrual cycle c. embryonic development i. conception to birth ii. compare frog, chicken, and human</p>	<p>Science, Technology, and Society – Students visit NIH to see the exhibit on artificial body parts (prosthetic limbs, cochlear implants, etc.)</p> <p>Regulation – Organisms regulate their internal environments through physiological and behavioral mechanisms.</p> <p>Evolution – Ectotherms have developed some endothermic characteristics to aid in flight and swimming.</p> <p>Evolution – Darwin's research supports embryonic development as evidence for evolution.</p>	<p>Chapter 41 Animal Nutrition</p> <p>Chapter 42 Circulation and Gas Exchange</p> <p>Chapter 43 Body's Defenses</p> <p>Chapter 44 Internal Environment</p> <p>Chapter 45 Chemical Signals in Animals</p> <p>Chapter 46 Animal Reproduction</p> <p>Chapter 48 Nervous System</p>
	<p>Students build a model of a virus and explain the pathway to infection and the body's specific immune response.</p>			Lab
	<p>Students visit the embryological development exhibit at the Walter Reed Library of Health and Medicine.</p>			<p>Lab #10 Physiology of the Circulatory System</p>

