

## Advanced Placement Biology Syllabus

Course overview: AP Biology is a rigorous course designed to be the equivalent of an introductory college-level biology class. It covers a lot of material in a very short time—and draws heavily on information learned during Biology I/PreAP Biology. Students can expect to have their previous knowledge of Biology pushed well beyond that required in previous classes. The College Board has recommended that 25% of AP Bio class time be spent on Molecules and Cells, 25% be spent on Heredity and Evolution and 50% of class time be spent on Organisms and Populations. This class is structured on that model. This is a class for self-motivated, hard-working students who have a sincere interest in the biological sciences, and offers them the chance to earn college credit during their high school career. The focus of the AP Biology class is successful completion of the AP Biology test in May. All students in AP Biology are encouraged to prepare for and take the AP Biology test. Pre-test review sessions (before/after school) will be scheduled as the test date gets closer. It is expected that all students will participate fully in all activities in class.

### Resources:

Textbook: Biology (6<sup>th</sup> edition) by Neil Campbell & Jane Reece. @ 2002. Publisher Benjamin Cummings  
Investigating Biology (4<sup>th</sup> edition) by J. Morgan and M. Carter. @ 2002. Publisher Benjamin Cummings  
HHMI Holiday Lecture Series: “The Immune System: Friend & Foe”; “Evolution”; “Of Hearts & Hypertension”; “RNA”; “2000 & Beyond”  
Video (DVD): PBS Video “Life’s Greatest Miracle”  
PBS Video: Evolution series  
DNAi Interactive: DVD; DNA Dolan Learning Center  
AP Lab Manual, 2001, College Board  
Cartoon Guide to the Environment by Larry Gonick. @1996. Publisher: Collins  
Handouts, packets, worksheets and problems as directed.

Internet Resources: Following are some internet resources which are very helpful. Please refer to them—and to the sources listed in your syllabus—often!

Estrella Mountain Community College’s Online Biology Textbook:  
<http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookTOC.html>  
Biology Animations: <http://www.johnkyrk.com/index.html>  
Case Western University textbook for Molecular and Cellular Biology:  
<http://bioweb.wku.edu/courses/Biol220CAR/>  
University of Arizona’s Biology Project: <http://www.biology.arizona.edu/>  
Microbiology Textbook: <http://www.bact.wisc.edu/Microtextbook/>  
DNA Dolan Learning Center: There are several great sites including:  
<http://www.dnafb.org/dnafb/> (DNA from the beginning)  
<http://www.ygyh.org/> (Your Genes, Your Health—genetic disorders)  
<http://www.geneticorigins.org/geneticorigins/> (Using DNA sequences as an evolutionary device. Neat mtDNA and ALU information)  
<http://www.dnai.org/index.html> (DNA Interactive. Roll your mouse over the “headings” and click to see each section)  
Howard Hughes Medical Institute: <http://www.hhmi.org/genetictrail/>  
Watson & Crick’s original paper: <http://www.nature.com/nature/dna50/watsoncrick.pdf>  
The Biology Place: LabBench, Coach, Glossary. This site is free and Lab Bench is an excellent place to preview AP Biology labs as you write your PreLabs! USE IT! [http://www.phschool.com/science/biology\\_place/](http://www.phschool.com/science/biology_place/)  
Biology Labs Online: <http://biologylab.awlonline.com/>  
Textbook Internet Site: <http://www.aw-bc.com/Campbell/> Students will be given instructions on accessing this website the first week of school.

Grading: Grades are issued in accordance with published district standards and are based on Tests, Free Response Questions, Research Projects, Homework and Lab work.

Homework: AP Biology is a rigorous, college level course requiring a substantial amount of preparation. Students should expect to spend at least 1 hour of “homework” each night. If no written homework is assigned, students should spend that hour reviewing notes/labs/text materials.

Research Projects: Students will also participate in several research projects throughout the year. These projects require substantial work outside the classroom, the production of written reports and in-class presentations. Research projects will have major impact on final grades.

Labs: Labs are designed to be an integral part of the AP Biology experience, and account for over 25% of classtime. In this class, we cover all of the 12 “required” AP Biology Lab exercises, as well as additional labs which have been deemed

useful to student understanding of the concepts covered. All Labs require a written PreLab assignment—which must be handed in the day before the lab. In addition, students will record data in their lab notebooks, and write up conclusions, analyses and abstracts. Students are encouraged to retain their AP Biology notebooks for possible college credit. The labs and hands-on activities done in this class are listed below and in the Syllabus, along with the approximate amount of time spent on each. Please note that approximately 69 out of 182 school days (37%) are spent in Hand-on Labs/Activities. (C4, C8)

<b>Name of Lab</b>	<b>Description</b>	<b>Type of Lab</b>	<b>Number of Days</b>
AP Lab #11a	Observation of Isopod behavior	Inquiry; Students design & conduct their own experiment after initial observations	2 days (Homework assignment)
AP Lab #11b	Observations of Mating Behavior in <i>Drosophila</i>	Hands-on, Student Observation	2 days (in-class)
AP Lab #12	Dissolved Oxygen & Primary Productivity	Hands-on, Students design	3 days
Wisconsin Fast Plants BioAssay	Students design experiments to test germination under different conditions	Inquiry; Student designed procedures	2 days
Molecular Modeling	Students manipulate MolyMod molecular models to discover condensation & hydrolysis reactions	Hands-on manipulatives, Inquiry	1 day
Construction of B-globin molecule	Students use toobers and models to construct 3D model of B-globin implementing knowledge of amino acids characteristics & levels of protein structure	Hands-on manipulatives	1 day
Lab: McMush	Students use chemical tests (Benedict's, Biuret, etc.) to determine macromolecules found in a Happy Meal	Hands-on lab.	1 day
AP Lab #2	Enzyme Catalysis	Hands-on lab.	3 days
AP Lab #1	Diffusion & Osmosis	Hands-on lab	4 days
AP Lab #5	Cellular Respiration	Hands-on (Probeware)	2 days
AP Lab #4a	Chromatography of Plant Pigments. For Inquiry extension, students bring in their own plants for analysis	Hands-on. Inquiry.	1 day
AP Lab 4b	Photosynthesis: Light Reactions	Hands-On (Probeware)	2 days
AP Lab #3a	Observing Onion Root Mitosis	Hands-On. Microscope observation lab.	1 day
AP Lab #3b	Meiosis	PopBead Meiosis	½ day
AP Lab #3b	Observing Meiosis in <i>Sordaria</i>	Hands-On.	1 day
AP Lab #7	Genetics of <i>Drosophila</i> . Students design genetic crosses, gather and analyze data.	Hands-On, Inquiry. Because of time constraints, most of this is done out of class.	2 days
Chi-Square Dry-Lab	Chi-Square Analysis. Students learn Chi-Square by observing color frequencies of M&M's	Hands-On Manipulative.	1 day
Bioinformatics Lab	Reading the gene for B-globin. Given the DNA sequence for B-globin, students determine reading frame, introns, exons stop and start sequences.	Inquiry	1 day

Antibody Genetics Lab	Students “splice” paper copies of antibody genes to derive varying antibody products.	Manipulative, Hands-on	1 day
Monsanto’s Restriction Enzyme Lab	Students “manipulate” paper copies of DNA sequences, revealing action of restriction enzyme cleavage	Manipulative, Hands-on	1 day
Monsanto’s pPOP Plasmid Lab	Students manipulate pop-bead models of bacterial plasmids to insert genomic DNA	Manipulative, Hands-On	1 day
AP Lab #6a	Bacterial Transformation. BioRad’s pGLO lab	Hands-on	2 days
AP Lab #6b	Restriction Enzyme cleavage of Lambda DNA (BioRad’s lab)	Hands-on	2 days
Biotechnology Activity	BLAST! Students use NCBI to BLAST DNA sequences	Inquiry	2 days
AP Lab #8	Population Genetics. Simulation using colored beads to represent alleles	Hands-On, Manipulatives	2 days
DNA Extractions	Students extract their own DNA from cheek cells	Hands-On	1 day
PCR Lab (TPA25)	PCR of Cheek Cell DNA	Hands-On	1 day
Electrophoresis of PCR fragments (TPA25)	Electrophoresis of PCR product. Students then calculate allele frequencies in class populations	Hands-On	1 day
Classification lab	Students use dichotomous keys to identify organisms	Hands-On	1 day
Prokaryotes in the Environment Lab	Students conduct environmental swabs to culture bacteria	Hands-on, Inquiry	2 days
Protist Lab	Students examine prepared slides of representative protists	Hands-on	2 days
Monocot/Dicot Lab	Students plant monocot/dicot seeds and observe them daily over a 2 week period.	Inquiry, Hands-on	5 days
AP Lab #9 Transpiration	Students use one plant from Monocot/Dicot lab to conduct whole plant version of the Transpiration lab. Mass & observe after 5 days	Inquiry, Hands-On	2 days
C-Fern Lab	Sex in a Dish. Students observe Alternation of Generations and Growth/Development in C-Fern	Hands-On	2 days
Flower Dissection Lab	Students dissect various flowers to identify anatomy	Hands-On	1 day
Fruit Classification lab	Students classify fruits	Hands-on	1 day
Hormonal Response Lab	Students treat Wisconsin Fast Plants rosette plants with hormones to stimulate growth	Hands-on	2 days
Anatomy Lab	Dissection of Chicken wing to illustrate muscles,	Hands-on	1 day

	ligaments, tendons bones, etc.		
AP Lab #10	Physiology of the Circulatory System	Hands-on	2 days
Stan's Salad Saga Lab	Students test foods for immunological response	Inquiry, Hands-On	2 days
Embryology Lab	Students observe developing zebra-fish embryos	Hands-On	1 day
Nervous System Lab	Students test nervous system response	Hands-On	1 day
Total Days in Lab Activity			69 days

Course Content/Themes: The course content for AP Biology is outlined by the College Board and includes chemistry, cells, heredity, genetics, evolution, ecology, plant and animal structure and function. In addition to these topics, you should look for the following overarching unifying themes: *Science as a Process*, *Evolution*, *Energy Transfer*, *Continuity and Change*, *Relationship of Structure to Function*, *Regulation*, *Interdependence of Nature*, *Science-Technology and Society*. Listed below is the topic outline provided by the College Board, listed with suggested time allotment and correlation to Missouri Show-Me Standards.

#### Topic Outline for AP Biology

Topics to be Covered	Percentage of Course	Missouri State Show-Me Standard Addressed
<b>I. Molecules and Cells</b>	<b>25%</b>	
A. Chemistry of Life (Water, Organic Molecules in organisms, Free Energy Changes, Enzymes)	7%	Sci. Performance: 1, 3, 4, 8 Knowledge Standards: 1.1, 3, 4, 5, 6; 3.4, 5, 6, 7; 4.6, 7
B. Cells (Prokaryotic and eukaryotic cells, membranes, Subcellular Organization, Cell cycle and regulation, )	10%	Sci. Performance: 3, 4, 7, 8 Knowledge Standards: 1.1, 3, 4, 5, 6; 3.4, 5, 6, 7; 4.6, 7
C. Cellular Energetics (Coupled reactions, Fermentation and cellular respiration, Photosynthesis)	8%	Sci. Performance: 1, 2, 3, 4, 7, 8 Knowledge Standards: 1.1, 3, 4, 5, 6; 3.4, 5, 6, 7; 4.6, 7
<b>II. Heredity &amp; Evolution</b>	<b>25%</b>	
A. Heredity (Meiosis and gametogenesis, Eukaryotic chromosomes, Inheritance patterns)	8%	Sci. Performance: 3, 4, 7, 8 Knowledge Standards: 1.1, 3, 4, 5, 6; 3.4, 5, 6, 7; 4.6, 7
B. Molecular Genetics (RNA and DNA structure and function, Gene regulation, Mutation, Viral structure and replication, Nucleic acid technology and applications)	9%	Sci. Performance: 3, 4, 7, 8 Knowledge Standards: 1.1, 3, 4, 5, 6; 3.4, 5, 6, 7; 4.6, 7
C. Evolutionary Biology (Early evolution of life, Evidence for evolution, Mechanisms of evolution)	8%	Sci. Performance: 3, 4, 7, 8 Knowledge Standards: 1.1, 3, 4, 5, 6; 3.4, 5, 6, 7; 4.6, 7
<b>III. Organisms and Populations</b>	<b>50%</b>	
A. Diversity of Organisms (Evolutionary patterns, Survey of the diversity of life, Phylogenetic classification, Evolutionary relationships)	8%	Sci. Performance: 3, 4, 5, 7, Knowledge Standards: 1.1, 3, 4, 5, 6; 3.4, 5, 6, 7; 4.6, 7, 8
B. Structure and Function of Plants and Animals (Reproduction, growth and development; Structural, physiological and behavioral adaptations; Response to the environment)	32%	Sci. Performance: 3, 4, 7, 8 Knowledge Standards: 1.1, 3, 4, 5, 6; 3.4, 5, 6, 7; 4.6, 7
C. Ecology (Population dynamics, Communities and ecosystems, Global issues)	10%	Sci. Performance: 1, 3, 4, 7, 8 Knowledge Standards: 1.1, 3, 4, 5, 6; 3.4, 5, 6, 7; 4.6, 7

**Advanced Placement Biology  
Syllabus—1<sup>st</sup> Semester  
Fall 2007**

Note: The following syllabus is a general outline of how the course content will be covered in class during the school year.

Unit/Day	Reading Assignment	Activity/Supplemental Resources	Curricular Requirements
Unit 1 Day 1	No reading assignment	Orientation to Bio AP, Textbooks, Syllabus, Summer Assignment	C6
Unit 1 Day 2		The Importance of the Free Response Question	
Unit 1 Day 3	Cartoon Guide to Environment  Campbell: Ch 50-55	<u>PowerPoint Notes:</u> Ecology Basics Structure of Ecosystems Major Terrestrial/Aquatic Biomes Population Ecology Symbiotic Relationships/Competition Trophic Relationships <b>(Interdependence in Nature)</b>	C3, C6
Unit 1 Day 4	Cartoon Guide to Environment  Campbell: Ch 50-55	<u>PowerPoint Notes:</u> continued Succession Productivity Biogeochemical Cycles Ecological “problems” (Biological magnification, Global Warming, Introduced Species, Habitat Fragmentation.) <u>Assignment due:</u> Summer Assignment due (Ecology/Experimental Design) <b>(Interdependence in Nature, Science Technology &amp; Society, Continuity and Change)</b>	C3, C6, C8
Unit 1 Day 5	AP Lab #12 pp. 136-145	<u>AP Lab #12: Dissolved Oxygen &amp; Primary Productivity Part 12a</u>	C3, C7, C8
Unit 1 Day 6	AP Lab #12 pp. 136-145	<u>AP Lab #12: Dissolved Oxygen &amp; Primary Productivity Part 12b</u>	C3, C7, C8
Unit 1 Day 7	AP Lab #12 pp. 136-145	<u>AP Lab #12: Dissolved Oxygen &amp; Primary Productivity Titration</u>	C3, C7, C8
Unit 1 Day 8	AP Lab Book pp. 145-161 AP Lab #11 pp. 125-135 Campbell p. 1-22	<u>Discussion:</u> Experimental Design <u>Gallery Walk:</u> <u>AP Lab #11a: Animal Behavior (Pillbugs)</u> <b>(Science as a Process)</b>	C3, C8
Unit 1 Day 9	Lab Handout	Experimental Design: <u>Lab: WFP Bioassay lab</u> <b>(Science as a Process)</b>	C3, C7, C8
Unit 1 Day 10	Campbell Ch. 51 pp. 1121-1144	<u>PowerPoint Notes:</u> Animal Behavior Learning, Cognition, Communication, Mating Systems <b>(Evolution, Regulation)</b>	C3
Unit 1 Day 11	AP Lab #11b pp. 132-135	<u>AP Lab #11b: Animal Behavior (Mating Behavior in Drosophila)</u> Observation of Drosophila: Basics	C3, C4, C8
Unit 1 Day 12		<u>AP Lab #11b: Animal Behavior (Mating Behavior in Drosophila)</u> Observation of Mating Behaviors	C3, C4, C8
Unit 1 Day 12		<u>Test:</u> Ecology & Chapter 1 <u>Assignment:</u> Worksheet Chapter 2-4	C3
Unit 2 Day 1	Campbell Chapter 2 pp. 24-38	<u>PreAssessment:</u> “Brain Drain” (Students “drain” their prior knowledge on chemistry on Whiteboards and share with class) <u>PowerPoint Notes:</u> Basic Chemistry Molecular structure <b>(Structure &amp; Function; Energy Transfer)</b>	C1, C6

Unit 2 Day 2	Campbell Chapter 3 pp. 41-40	<u>PowerPoint Notes:</u> Water: Structure and Function Properties of Water, Cohesion, Adhesion, Polarity, pH, buffers <u>Activity:</u> “6 cups of Water” (3D Molecular Designs activity illustrating cohesion, adhesion, polarity and hydration shells) <b>(Structure &amp; Function)</b>	C1, C6
Unit 2 Day 3	Campbell Ch. 4 (all), Ch. 5 (p. 62-68)  Review Functional Groups	<u>PowerPoint:</u> Carbon Carbon Chemistry, Macromolecules, Carbohydrates <u>Activity:</u> Functional Group Review <u>Assignment:</u> Worksheet Chapter 5 <b>(Structure &amp; Function; Energy Transfer)</b>	C1, C6
Unit 2 Day 4	Campbell Ch. 5 pp. 62-68	<u>Activity: Molecular Modeling:</u> (Use MolyMod molecular models to model dehydration & hydrolysis reactions with glucose)	C1
Unit 2 Day 5	Campbell Ch. 5 (p. 71-80)	<u>PowerPoint Notes:</u> Protein Structure Primary, Secondary, Tertiary & Quaternary structure of proteins <u>Activity: Toobers</u> (Use 3D Molecular Design “toobers” to model 4 levels of protein structure) <b>(Structure &amp; Function)</b>	C1, C6
Unit 2 Day 6		<u>Activity: Constructing B-globin</u> (3D Molecular Designs modeling activity—students build a model of the B-globin molecule)	C1, C6
Unit 2 Day 7		<u>Research Project: Using the Protein Data Base</u> (Students choose a protein, research and report on it’s structure/function) <b>(Structure &amp; Function)</b>	C1, C4, C7
Unit 2 Day 8	Ch. 5 pp. 68-71; 81-84	<u>PowerPoint Notes:</u> Lipids & Nucleic Acids <u>Report: PDB Molecules due</u> <b>(Structure &amp; Function; Energy Transfer)</b>	C1, C6, C7
Unit 2 Day 9	Lab Handout	<u>Lab: McMush</u> <b>(Science as a Process)</b>	C1, C8
Unit 2 Day 10	Ch. 6 pp. 87-96	<u>PowerPoint Notes:</u> ATP, Energy, Metabolism, Enzymes <b>(Structure &amp; Function; Energy Transfer)</b>	C1, C6
Unit 2 Day 11	Ch. 6 pp. 96-103	<u>PowerPoint Notes:</u> Enzymes Enzyme structure, Lock & Key model, Active & Allosteric sites, Inhibition <u>Activity: “Toothpickase”</u> <b>(Structure &amp; Function)</b>	C1, C6
Unit 2 Day 12	AP Lab 2A, C	<u>AP Lab #2: Enzyme Catalysis (Part A, C)</u>	C1, C4, C8
Unit 2 Day 13	AP Lab 2B, D	<u>AP Lab #2: Enzyme Catalysis (Part B, D)</u>	C1, C4, C8
Unit 2 Day 14		<u>Lab Discussion</u>	C1, C4, C8
Unit 2 Day 15		Test: Unit 2—Chapter 2-6 Assignment: Worksheet Chapter 7	
Unit 2 Day 16		Test (cont.) Free Response Question	
Unit 3 Day 1	Campbell Ch. 7 pp. 108-135	<u>PowerPoint Notes:</u> Prokaryotic/Eukaryotic cells, Cell Organization, Organelles <b>(Evolution, Structure &amp; Function)</b>	C1, C5, C6
Unit 3 Day 2	Campbell Ch. 8 pp. 138-144	<u>PowerPoint:</u> Membranes Phospholipid bilayer, Fluid Mosaic Model <u>Assignment:</u> Worksheet Chapter 8 <b>(Structure &amp; Function)</b>	C1, C6
Unit 3 Day 2	Ch. 8 pp. 144-148	<u>PowerPoint:</u> Diffusion/Osmosis Active/Passive Transport Membrane permeability/aquaporins Diffusion	C1, C6

		Osmosis (Tonicity) <b>(Structure &amp; Function)</b>	
Unit 3 Day 3	AP Lab #1 A, E	<b>AP Lab #1: Diffusion &amp; Osmosis (Part 1E Plasmolysis, 1A Diffusion)</b> <b>(Structure &amp; Function, Energy Transfer, Regulation)</b>	C1, C8
Unit 3 Day 4	AP Lab #1 B, C	<b>AP Lab #1: (Part 1B, 1C) Osmosis</b> <b>(Structure &amp; Function)</b>	C1, C8
Unit 3 Day 5	AP Lab #1 C	<b>AP Lab #1: (Part 1C) Water Potential</b> <b>(Structure &amp; Function)</b>	C1, C8
Unit 3 Day 6	AP Lab #1 D	<b>AP Lab #1: Part 1D: Calculating Water Potential</b> <b>(Structure &amp; Function)</b>	C1, C8
Unit 3 Day 7		More Lab Discussion (?)	C1, C8
Unit 3 Day 8	Ch. 8 pp. 148-152 Ch. 11 pp. 197-212	<u>PowerPoint Notes:</u> Active Transport/Pumps CoTransport/Symport/Antiport Exocytosis/Endocytosis <u>PowerPoint Notes:</u> Cell Communication Signal Transduction pathways G-Protein Receptors & Protein Kinases <b>(Structure &amp; Function, Regulation)</b> Assign Research Projects (See below)	C1, C5, C6
Unit 3 Day 9	Research	<u>Cell Signaling Research Project</u> (Students research disorders related to dysfunction in cell signal pathways and present poster board session reports to the class) <b>(Structure &amp; Function, Regulation)</b>	C1, C4, C6, C7
Unit 3 Day 10	Research	<u>Cell Signaling Research Project (cont.)</u> <b>(Structure &amp; Function, Regulation)</b>	C1, C4, C6, C7
Unit 3 Day 11		<u>Class Presentations/Research Project</u> <b>(Structure &amp; Function, Regulation)</b>	C1, C4, C6, C7
Unit 3 Day 12		TGT (Review for Test)	
Unit 3 Day 13		Test (Chapter 7-8, 11) <u>Assignment:</u> Worksheet Chapter 9	
Unit 4 Day 1		Test (cont.) Free Response Question	
Unit 4 Day 2	Campbell Ch. 9 pp. 155-160 & 170-172	<u>PowerPoint Notes:</u> Redox Reactions, ATP, Metabolism <b>(Structure &amp; Function, Energy transfer)</b>	C1, C6
Unit 4 Day 3	Campbell Ch. 9 pp. 160-161	Discussion: Glycolysis <b>(Energy transfer)</b>	C1, C5
Unit 4 Day 4	Campbell Ch. 9 pp. 170-171	<u>PowerPoint Notes:</u> Fermentation <b>(Energy transfer)</b> <u>Activity:</u> Fermentation of Root Beer	C1, C6
Unit 4 Day 5	Campbell Ch. 9 pp. 161-164	<u>Discussion:</u> Bridging & Krebs cycles <b>(Energy transfer)</b>	C1, C6
Unit 4 Day 6	Campbell Ch. 9 pp. 164-170	<u>Discussion:</u> Chemiosmosis and the ETC <b>(Energy transfer)</b>	C1, C6
Unit 4 Day 7		<u>Activity:</u> Logger Pro Basics (Acquaint student with use of LoggerPro and sensors) <b>(Science, Technology &amp; Society)</b>	C1, C8
Unit 4 Day 8	AP Lab #5	<b>AP Lab #5: Cellular Respiration</b> (LoggerPro version using Vernier Probeware) <b>(Regulation, Energy Transfer)</b>	C1, C4, C8
Unit 4 Day 9	Campbell Ch. 9 pp. 172-173	<u>PowerPoint Notes:</u> Metabolic Pool Catabolism/Anabolism <u>Assignments:</u> Worksheet Chapter 10 <b>(Regulation, Energy Transfer)</b>	C1, C4

Unit 4 Day 10	Campbell Ch. 10 pp. 176-184	<u>Discussion:</u> Chloroplast Structure Stomates Pigments <b>(Structure &amp; Function, Energy Transfer)</b>	C1, C6
Unit 4 Day 11	AP Lab #4A	<u>AP Lab #4 Part 4A: Chromatography of Plant Pigments</u>	C1, C8
Unit 4 Day 12	Campbell Ch. 10 pp. 184-189	<u>PowerPoint Notes:</u> Photosystems I and II Light Reactions—Cyclic/Noncyclic <b>(Structure &amp; Function, Energy Transfer)</b>	C1, C5
Unit 4 Day 13	AP Lab #4 B	<u>AP Lab #4 Part 4B: Light Reactions</u>	C1, C8
Unit 4 Day 14	Campbell Ch. 10 pp. 189-194	<u>PowerPoint Notes:</u> Light Independent Reactions CAM Plants C <sub>4</sub> Plants Photorespiration <b>(Structure &amp; Function, Energy Transfer)</b>	C1, C6
Unit 4 Day 15		TGT (Review for Test)	
Unit 4 Day 16		Test: Chapter 9, 10 Assignment: Worksheet Chapter 12	
Unit 5 Day 1	Campbell Ch. 12 pp. 215-220; 224-229 Chapter 12 pp. 218-219	Activity: “Brain Drain”: Mitosis & Cell Cycle PowerPoint: Mitotic Cell Cycle Mitosis Cancer <u>Activity: Surface Area/Volume Problem (Calculator based exploration)</u> Assignment: Worksheet Chapter 13 <b>(Regulation; Structure &amp; Function)</b>	C1, C2, C6
Unit 5 Day 2	AP Lab #3	<u>AP Lab #3, Part 3A Observing Mitosis (Onion Root Tip)</u> <b>(Structure &amp; Function)</b>	C1, C8
Unit 5 Day 3	Campbell Ch. 13 pp. 234-243	Discussion: Meiosis Activity: AP Lab #3B (Meiosis—PopBeads) <b>(Structure &amp; Function)</b>	C2
Unit 5 Day 4	Campbell Ch. 13 pp. 243 - 245	PowerPoint Notes: Meiosis -- Variation: Crossing Over and Mapping Meiosis in Fungi <b>(Continuity &amp; Change)</b>	C2
Unit 5 Day 5	AP Lab #3B	<u>AP Lab #3B2: Meiosis in Sordaria</u>	C2, C8
Unit 5 Day 5		Test Assignment: Worksheet Chapter 14	
Unit 6 Day 1	Campbell Ch, 14 pp. 247-254	Discussion: Gregor Mendel Mendelian Inheritance <b>(Continuity &amp; Change)</b>	C2, C6
Unit 6 Day 1	Campbell Ch. 13 pp. 254-255	<u>Activity: Probability &amp; Branching Fork diagrams</u> <u>Probability “Races”</u> (Students predict probable outcomes of genetic crosses using Punnett Squares, Probability and Branching Fork Diagrams) Assignment: Genetics Problems Worksheet	C2
Unit 6 Day 2	M&M Chi Square Activity Handout	<u>Activity:</u> Chi-Square Analysis (Students learn Chi-Square by analyzing the number/color of prepackaged M&M’s against claims by the company)	C2
Unit 6 Day 3	AP Lab #7	<u>AP Lab #7 Drosophila</u> <u>Week 1: Set up crosses</u> (Note: The remainder of this lab is to be conducted out of class by students) <b>(Continuity &amp; Change)</b> Assignment: Worksheet Chapter 14	C2, C4, C6, C8



Unit 6 Day 4	Campbell Ch. 14 pp. 255-266	<u>Powerpoint Notes:</u> Non-Mendelian Inheritance, Constructing and Analysing Pedigrees <u>Assignments:</u> Worksheet Chapter 15 <b>(Continuity &amp; Change)</b>	C2, C6
Unit 6 Day 5	Campbell Ch. 15 pp. 269-276	<u>PowerPoint Notes:</u> Into the Fly Room—Morgan, Drosophila, chromosomes, Chromosomal mutations <b>(Structure &amp; Function)</b>	C2
Unit 6 Day 6		HHMI Lecture: <b>(Science as a Process, Continuity &amp; Change)</b>	C2, C6
Unit 6 Day 7		TGT (Review for Test)	
Unit 6 Day 8		Test	
Unit 7 Day 1	Ch. 16 pp. 287-301  Reading Assignment: <a href="http://www.nature.com/nature/dna50/watsoncrick.pdf">http://www.nature.com/nature/dna50/watsoncrick.pdf</a> (Watson & Crick's original paper)	PowerPoint: The Race for the Double Helix (How Watson & Crick figured out their model) Molecular Basis of Inheritance: Structure of DNA molecule Replication Leading/lagging strands: Okazaki fragments <b>(Structure &amp; Function)</b> Video: DNAi Animations	C2
Unit 7 Day 2		<u>Activity:</u> DNA Magnets (Student manipulate shapes representing the components of nucleotides on the board to model DNA Replication, Transcription and Translation) <b>(Structure &amp; Function, Regulation)</b>	C1, C2
Unit 7 Day 3		<u>PowerPoint Notes:</u> DNA Structure (continued) Transcription Video: DNAi Animation Transcription <b>(Structure &amp; Function, Regulation)</b>	C1, C2
Unit 7 Day 4	Campbell Ch. 17 pp. 303-322	<u>PowerPoint Notes:</u> Translation Video: DNAi animation Translation <u>Activity:</u> DNA Magnets (cont.) <b>(Structure &amp; Function, Regulation)</b>	C1, C2
Unit 7 Day 5		<u>Activity:</u> B-globin activity (3D Molecular Designs Bioinformatics activity) (Students decipher reading frame of B-globin molecule by looking for "clues" in DNA/RNA Sequence. In the process Starting sequences, Stop codons, introns and exons are revealed) <b>(Structure &amp; Function, Continuity &amp; Change)</b>	C1, C2, C4, C7
Unit 7 Day 6	Campbell Ch. 17 pp. 322-325	<u>Discussion/Activity:</u> Control of Transcription, Translations (Promoters, Terminators, TATA boxes, Poly-A tails, Splicing, etc.) <b>(Regulation)</b>	C1, C2
Unit 7 Day 7	Campbell Ch. 18 pp. 328-350	<u>PowerPoint Notes:</u> Genetics of Viruses and Bacteria <b>(Continuity &amp; Change)</b>	C3
Unit 7 Day 8	Campbell Ch. 19 pp. 354-368	<u>PowerPoint Notes:</u> Eukaryotic Genomic Organization/Control Operons <b>(Regulation, Structure &amp; Function)</b>	C1, C3
Unit 8 Day 9		<u>Activity:</u> Splicing Antibodies (Paper exercise where students model alternative splicing mechanisms that produce the wide variety of antibodies) <b>(Continuity &amp; Change, Structure &amp; Function)</b>	C1, C3, C4
Unit 8 Day 10		Final Exam <u>Assignment:</u> Worksheet Chapter 20	

**Advanced Placement Biology  
Syllabus—2<sup>nd</sup> Semester  
Spring 2006**

Unit/Day	Reading Assignment	Activity/Supplemental Resources	Curriculum Requirements
Unit 9 Day 1	Campbell Ch. 20 pp. 375-399	<u>PowerPoint Notes</u> : Biotechnology Restriction Enzymes/Plasmids Re: Bacterial transformation PCR Video: DNAi animation <b>(Continuity &amp; Change)</b>	C1, C2, C4
Unit 9 Day 2	Lab Handout: Restriction Enzymes  H/W handout: pPop Plasmids	<u>Activity: Restriction Enzymes</u> (Dry Lab by Monsanto illustrating action of Restriction Enzymes) <b>(Continuity &amp; Change)</b>  <u>H/W: pPop Plasmids</u> (Dry Lab by Monsanto using pop-beads to illustrate Bacterial Transformation)	C1, C3
Unit 9 Day 3	Lab: pGLO	<u>AP Lab #6, Part 6A: Bacterial Transformation</u> (BioRad's pGLO kit)	C1, C3, C8
Unit 9 Day 4	Lab: pGLO	<u>AP Lab #6, Part 6A (cont.)</u> (BioRad's pGLO kit) <b>(Continuity &amp; Change)</b>	C1, C3, C8
Unit 9 Day 5	Lab: Restriction Enzymes & Lambda DNA	<u>AP Lab 6B: Restriction Enzymes of Lambda DNA</u> (BioRad's Lambda DNA kit) <b>(Continuity &amp; Change)</b>	C1, C3, C8
Unit 9 Day 6	Lab: pGLO	<u>AP Lab 6B: Restriction Enzymes of Lambda DNA</u> (BioRad's Lambda DNA kit) <b>(Continuity &amp; Change)</b>	C1, C3, C4, C8
Unit 9 Day 7	Lab: BLAST Handout	<u>Activity: BLAST!</u> (Students utilize NCBI resources to investigate structure/function of DNA/RNA & Proteins) <b>(Science, Technology &amp; Society)</b>	C1, C3, C8, C7
Unit 9 Day 8		Test	
Unit 10 Day 1	Campbell Chapter 23, pp. 445-452  Lab: AP Lab #8A	<u>Activity: Fishing in the gene pool</u> (Hardy Weinberg and Population Genetics activity using Pepperidge Farm Goldfish as organisms) <u>Lab: AP Lab #8a: Estimating Allele Frequencies for a Specific Trait within a Sample Population</u> <b>(Evolution)</b>	C3, C5, C8
Unit 10 Day 2	Lab: Extraction of Cheek Cell DNA	<u>Lab: Extraction of Cheek Cells</u> (Materials/Instructions for this lab are part of a partnership with the University of Missouri/Columbia which donates material and equipment for students to experience Extraction, PCR and Electrophoresis) <b>(Science, Technology &amp; Society)</b>	C1, C3, C4, C8
Unit 10 Day 3	Lab: PCR of TPA25	<u>Lab: PCR of TPA25 Alu</u> (Materials/Instructions for this lab are part of a partnership with the University of Missouri/Columbia which donates material and equipment for students to experience Extraction, PCR and Electrophoresis) <b>(Science, Technology &amp; Society)</b>	C1, C2, C4, C8
Unit 10 Day 4	Lab: Electrophoresis of TPA25	<u>Lab: Electrophoresis of TPA25</u> (Materials/Instructions for this lab are part of a partnership with the University of Missouri/Columbia which donates material and	C1, C2, C4, C8

		equipment for students to experience Extraction, PCR and Electrophoresis) <b>(Science, Technology &amp; Society)</b>	
Unit 10 Day 4	Campbell Ch. 22, pp. 452-461	<u>PowerPoint Notes</u> : Descent with Modification: A Darwinian View of Life <b>(Evolution)</b>	C3, C6
Unit 10 Day 5	Ch. 23, pp. 464-481	<u>PowerPoint Notes</u> : The Origin of Species <b>(Evolution)</b>	C3, C6
Unit 10 Day 6	Lab: Population Genetics pp. 268-287 Morgan/Carter	<u>AP Lab #8: Population Genetics</u> (Adaptation of AP Lab #8 using colored beads as individual alleles. This lab comes from the <u>Investigating Biology</u> , by Morgan/Carter) <b>(Evolution)</b>	C3, C6, C8
Unit 10 Day 7	Lab: Population Genetics pp. 268-287 Morgan/Carter	<u>AP Lab #8: Population Genetics</u> (Adaptation of AP Lab #8 using colored beads as individual alleles. This lab comes from the <u>Investigating Biology</u> , by Morgan/Carter) <b>(Evolution)</b>	C3, C6, C8
Unit 10 Day 8		HHMI: Evolution Video Lecture 1 <b>(Evolution)</b>	C3, C6
Unit 10 Day 9		HHMI: Evolution Video Lecture 4 <b>(Evolution)</b>	C3, C6
Unit 10 Day 10		<u>Activity</u> : Dragon Genetics Online activity where students “breed” dragons <b>(Continuity &amp; Change)</b>	C3, C6
Unit 10 Day 11		Test <u>Assignment</u> : Worksheet Chapter 25	
Unit 11 Day 1	Ch. 25 pp. 484-501	<u>Powerpoint Notes</u> : Phylogeny and Systematics <b>(Evolution)</b>	C3, C6
Unit 11 Day 2		<u>Activity: Traditional Classification Dichotomous Key (Shells)</u> (Teacher designed activity where students practice traditional classification using a dichotomous key) <b>(Evolution)</b>	C3, C6
Unit 11 Day 3		<u>Activity: Constructing Cladograms</u> (Teacher designed activity where students practice classifying organisms cladistically) <b>(Evolution)</b>	C3, C6
Unit 11 Day 4		<u>Activity: Cladograms (cont.)</u> (Teacher designed activity where students practice classifying organisms cladistically) <b>(Evolution)</b>	C3, C6
Unit 11 Day 5	Chapter 27 pp. 526-542	<u>PowerPoint Notes</u> : Prokaryotes Brief Overview <b>(Evolution)</b>	C3, C6
Unit 11 Day 6	Lab:	<u>Lab: Environmental Swab in search of prokaryotes</u> (Students conduct environmental swabs to detect prokaryotic organisms in school) <b>(Interdependence in Nature)</b> Or <u>Lab: Monera/Protista</u> (Microscope observation lab)	C3, C4
Unit 11 Day 7	Chapter 28 pp. 545-558	<u>PowerPoint Notes</u> : Protista Overview <b>(Evolution)</b>	C3
Unit 11	Chapter 28	<u>PowerPoint Notes</u> : Protista (cont.)	C3

Day 8	pp. 558-572	Overview (cont.) <b>(Evolution)</b>	
Unit 11 Day 9		<b>Lab: Microscopic Examination of representative protists</b> (Microscope observation Lab) <b>(Evolution)</b>	C3, C4
Unit 11 Day 10		<b>Lab (cont.)</b> <b>(Evolution)</b>	C3, C4
Unit 11 Day 11	Lab Handout	<b>Activity: Monocot/Dicot Activity:</b> (Students plant and observe development of seeds, comparing monocot/dicot structure) Review (Take home) <b>(Structure &amp; Function)</b>	C3, C4
Unit 11 Day 12		Test	
Unit 12 Day 1	Campbell Chapter 29 pp. 575-576; 578-584; 589- 594	<u>PowerPoint Notes:</u> Plants Evolution Land plants  <u>Activity:</u> Monocot/Dicot Activity: Pull up one monocot & one dicot plant and compare. <b>(Evolution; Structure &amp; Function)</b>	C3, C4, C5
Unit 12 Day 2	Campbell Chapter 30 pp. 597-600; 606-612	<u>PowerPoint Notes:</u> The Evolution of Seed Plants <b>(Evolution)</b> <u>Activity:</u> Monocot/Dicot Activity: Pull up one monocot and one dicot plant and examine and compare	C3, C4, C5
Unit 12 Day 3	AP Lab #9	<u>AP Lab #9 Transpiration</u> (Whole plant version. Transplant seeds; place in treatment conditions.) <b>(Evolution)</b> <u>Activity:</u> Monocot/Dicot Activity: Examine Seeds	C3, C8
Unit 12 Day 4	Campbell Chapter 35, pp. 720-732	<u>PowerPoint Notes:</u> Plant Structure & Tissues <b>(Structure &amp; Function)</b>	C3, C6
Unit 12 Day 5	Campbell Chapter 35 pp. 732-744	<u>PowerPoint Notes:</u> Plant Growth and Development: Organs <b>(Structure &amp; Function)</b>	C3, C4
Unit 12 Day 6	Campbell Chapter 36, pp. 748-764	<u>PowerPoint Notes:</u> Transport in plants Review: Osmosis & Water Potential Bulk flow Phloem/xylem Transpiration <b>(Structure &amp; Function)</b>	C3, C4
Unit 12 Day 7	AP Lab #9	<u>AP Lab #9: Transpiration</u> (Mass out plants and conclude lab)	C3, C8
Unit 12 Day 8	Campbell Chapter 37, pp. 767-780	<u>PowerPoint:</u> Plant Nutrition Macro/micronutrients Soil Nitrogen fixation <b>(Structure &amp; Function, Energy Transfer)</b>	C3
Unit 12 Day 9	Campbell Chapter 38, pp. 783-796	Lecture: Plant Reproduction & Development Alternation of Generations Flowers Double fertilization & seed development Asexual development <b>(Structure &amp; Function, Regulation, Continuity &amp; Change)</b>	C3, C4
Unit 12 Day 10	Lab: C-Fern	<b>Lab: C-Fern (set up lab)</b> <b>(Structure &amp; Function)</b>	C3, C8
Unit 12 Day 11	Lab: Flower Dissection	<b>Lab: Flower Dissection</b> <b>(Structure &amp; Function)</b>	C3, C4
Unit 12 Day 12	Lab: Fruit/Vegetable	<b>Lab: Fruit/Vegetable Classification</b> <b>(Structure &amp; Function)</b>	C3, C4
Unit 12 Day 13	Campbell Chapter 39,	Lecture: Plant Response to Signals Review: Signal transduction	C3, C5

	pp. 802-806, 817-829	Hormonal response Response to light <b>(Regulation, Structure &amp; Function)</b>	
Unit 12 Day 14	Campbell Chapter 39, pp. 806-817	PowerPoint Notes: Plant Response to Hormones (cont.) Plant hormones & their action <b>(Regulation, Structure &amp; Function)</b>	C3, C5
Unit 12 Day 15	Lab Handout	<b>Lab: Plant Response to Hormonal signals</b> (Wisconsin Fast Plant lab—response to Gibberellic Acid) <b>(Regulation, Structure &amp; Function)</b>	C3, C4, C5
Unit 12 Day 16		Review	
Unit 12 Day 17		Test: Plants (Chapter 35-39)  <u>Assignment:</u> Parade through the Animal Kingdom	
Unit 13 Day 1	Chapter 32 pp. 633-643	PowerPoint: Animal Evolution Brief review of phyla <b>(Evolution)</b>	C3, C5
Unit 13 Day 2	Chapter 33, pp. 646-675	PowerPoint: Invertebrates Brief review <b>(Evolution)</b>	C3, C5
Unit 13 Day 3	Chapter 34, pp. 678-686	PowerPoint: Vertebrates Brief review <b>(Evolution)</b>	C3, C5
Unit 13 Day 4	Lab Handout	<b>Lab: Chicken Dissection</b> (Investigation of anatomy of muscle/bone structure using chicken from grocery store) <b>(Structure &amp; Function)</b>	C3, C4
Unit 13 Day 5		<b>Lab: (cont.)</b> <b>Structure &amp; Function)</b>	C3, C4
Unit 13 Day 6	Ch. 42 pp. 871-885	PowerPoint: Circulation Open/Closed systems Mammalian circulation/heart Capillary Exchange Cellular Elements Control systems <b>(Structure &amp; Function, Regulation)</b>	C3
Unit 13 Day 7		HHMI Lecture: Cardiology <b>(Structure &amp; Function, Regulation)</b>	C3
Unit 13 Day 8		<b>AP Lab #10 Physiology of the Circulatory System</b> <b>(Structure &amp; Function, Regulation)</b>	C3, C8
Unit 13 Day 9		<b>AP Lab #10 Physiology of the Circulatory System (cont)</b> Test: Ch. 32, 22, 24, 42 <b>(Structure &amp; Function, Regulation)</b>	C3, C8
Unit 14 Day 1	Ch. 43 pp. 900-921	PowerPoint: The Body's Defenses Nonspecific defense/Inflammatory response Specific immunity B & T lymphocytes <b>(Structure &amp; Function, Regulation)</b>	C3
Unit 14 Day 2		PowerPoint: The Body's Defenses (cont.) Primary & Secondary immune response MHC molecules & Antigen presentation Humoral response Immunodeficiency diseases <b>(Structure &amp; Function, Regulation)</b>	C3, C5
Unit 14 Day 3		HHMI Immune System Lecture #1 <b>(Structure &amp; Function, Regulation)</b>	C3, C5
Unit 14 Day 4		<b>Lab: Stan's Salad Saga</b> Immunology lab—allergic response <b>(Structure &amp; Function, Regulation)</b>	C3, C4, C8
Unit 14 Day 5	Chapter 44 pp. 941-951	PowerPoint: Homeostasis Excretory System <b>(Structure &amp; Function, Regulation)</b>	C3, C5

Unit 14 Day 6		HHMI: Of Hearts & Hypertension Lecture #2 <b>(Structure &amp; Function, Regulation)</b>	C3, C5
Unit 14 Day 7	Chapter 46 pp. 975-995	PowerPoint: Reproduction Sexual reproduction: mechanisms <b>(Structure &amp; Function, Regulation)</b>	C3, C5
Unit 14 Day 8		Video: Miracle of Life	C3, C5
Unit 14 Day 9	Chapter 47 pp. 999-1011	PowerPoint: Animal Development Activation of egg Fusion Cleavage <b>(Structure &amp; Function, Regulation)</b>	C3, C5
Unit 14 Day 10	Chapter 47 pp. 1012-1019	PowerPoint: Animal Development Organogenesis <b>(Structure &amp; Function, Regulation)</b>	C3, C5
Unit 14 Day 11		<b>Lab: Zebrafish Embryology</b> Observe development of embryos <b>(Structure &amp; Function, Regulation)</b>	C4, C5, C8
Unit 14 Day 12	Ch. 47 pp. 1022-1038	PowerPoint: Nervous System Nerve structure/function Nerve signals/polarization Brain/Spinal Cord <b>(Structure &amp; Function, Regulation)</b>	C4, C4
Unit 14 Day 13		<b>Lab: Nervous System</b> Student's test response time	C4, C4
Unit 14 Day 14		Test: Ch 43, 44, 46, 47	
Exam Review	AP Exam Review	Ecology	
Exam Review	AP Exam Review	Chemistry	
Exam Review	AP Exam Review	Cells	
Exam Review	AP Exam Review	Cell Cycle	
Exam Review	AP Exam Review	Energetics	
Exam Review	AP Exam Review	Heredity	
Exam Review	AP Exam Review	Molecular Genetics	
Exam Review	AP Exam Review	Evolution	
Exam Review	AP Exam Review	Plants	
Exam Review	AP Exam Review	Animals	
AP Biology		<b>AP BIOLOGY EXAM (given in the morning)</b>	
		Video: Lorenzo's Oil	C3
		Video: Lorenzo's Oil	C3
		Video: Lorenzo's Oil	C3
		<b>Research Project—Rare Inherited Disorders &amp; Their Prognosis</b>	C2
		<b>Research Project—Rare Inherited Disorders &amp; Their Prognosis</b>	C2
		Research Project Reports	C2
		Research Project Reports	C2