AP Biology – Syllabus

Course Overview
Students will demonstrate the ability to use the scientific method and major biological concepts to explain the uniqueness and interdependence of living organisms, their interactions with the environment, and the continuation of life on earth. Students will show that they can apply their understanding of biology to their life as they make choices regarding themselves, and as they evaluate decisions and conclusions made by society.

Students primarily use their textbook as the source for information in this course. There are times, however, when students are asked to locate information not found in the textbook, or to read other materials beyond the textbooks. These may take the form of having students use the internet to answer questions, or to read articles provided by me for enrichment of the current topic. Articles may be taken from *Discover* magazine, *Science* or *Science News*, *Natural History*, or *Scientific American*. Students may view videos to enhance their understanding of some topics – these have been selected to reflect the most current trends in scientific thinking in the field.

Labs, homework, and other classroom activities make up the classwork component of the students' grades. Students take quizzes during each unit, with a unit test provided at the end of each unit. Grades are computed as follows: 60% Tests & Quizzes, 40% Labs, Homework, & Classwork

Textbooks & Resources
Biology, *6th Ed.* Campbell, Neil A. and Jane B. Reese. (2002) Benjamin Cummings, San Francisco ISBN 0-8053-6624-5

Cliffs Advanced Placement Biology Examination Preparation Guide. Pack, Phillip E., Ph.D. (2001) Cliffs Notes, Inc., Lincoln, Nebraska. ISBN 0-8220-2301-6.

AP® Biology Lab Manual for Students (2001), College Board AP Advanced Placement Program.

Class Periods (145 days)	Focus	Chapter(s) Campbell, 6th	Lecture Topics, Labs, & Activities
4	Introduction		
	Scientific Method	1	Termite Lab– Student-designed exploration of the behavior of terms when exposed to Papermate pen ink; application of the methods of science; full laboratory write-up with problem stated, background research & references, hypothesis, methods and materials, data collection and analysis, conclusions, and application to future study of biology. **(science as a process)**
	Unifying Themes		Unifying Themes Project – students relate at least 5 of the 8 Unifying Themes to a report of scientific research (articles chosen by students from *Discovery, Science, Science News, Scientific American*, at least 2 full pages in length). (**all themes addressed**)
	I. Molecules & Cells		
10 (7%)	**1. Chemistry of Life**		
	General chemistry	2	Review of General Chemistry topics: atoms, bonds, relationship of molecule's biological function to its shape, chemical reactions (**relationship of structure to function**)
	Water	3	

			Properties of Water lab – Students examine several properties of water such as polarity, surface tension, capillary action, adhesion, cohesion, evaporative cooling, high specific heat, and expansion upon freezing (see Apple Peel Lab in Cells Unit)
	Organic Compounds	4,5	Carbon compounds, functional groups Structure and functions of carbohydrates, lipids, proteins, and nucleic acids (**relationship of structure to function**) In-class Essay – Carbon Compounds McMush – Students analyze the nutritional content of a McDonald's Happy Meal; application of knowledge of a healthy diet to the actual diet of a teenager & the current issue of childhood obesity **(science, technology, & society)** Modeling protein folding – using pipe cleaners, students visualize the 4 levels of structure of proteins; students "see" the relationship between structure of the protein and functional parts of the protein (e.g., active site of an enzyme) **(relationship of structure to function)**
	Enzymes Energy	6 6	Characteristics of enzymes, effects of cellular environment on enzyme activity, conformational changes in denatured and allosteric enzymes **(interdependence in nature)** #2 Enzyme Catalysis – Students measure the rate of a reaction in the presence & absence of a catalyst (catalase) The Laws of Thermodynamics – energy in the universe vs. energy in a closed system; how organisms transform energy; exergonic vs. endergonic reactions **(energy transfer)** A Can of Bull? Do Energy Drinks Really Provide a Source of Energy? Students perform a case study of the biochemical analysis of energy drinks – a product many students use; students complete several tasks, including writing a review for a magazine about the nutritional and energy value of energy drinks **(science, technology, & society)**
	Unit Test 1. Chemistry of Life – Water, Organic Compounds, Energy & Enzymes		
14.5 (10%)	**2. Cells**		
	Prokaryotes, Eukaryotes	7	Bacteria lab activity; comparison of prokaryotes and eukaryotes; evolutionary advancements of the eukaryotic cell **(evolution)** Surface Area/Volume lab (phenolphthalein agar blocks & NaOH – diffusion in different sized blocks)
	Cell Membranes, Cell Communication	8, 11	Structure and function of the phospholipid bilayer; role of embedded proteins; membrane carbohydrates **(relationship of structure to function)** Movement of materials across a membrane: passive vs. active transport, balance of water uptake and loss, voltage potentials;

			movement of large molecules **(regulation)** Cell signaling and communication; signal receptors #1 Diffusion & Osmosis – Students investigate water movement across semipermeable membranes (dialysis tubing, potato cells) **(regulation)** Apple Peel Lab – Student-designed lab in which students hypothesize the results of freezing on cell membrane/cell wall structure in apple peels, students use Vernier colorimeters to detect release of anthocyanins from apple peel cells (relates current membrane study to prior study of properties of water) **(science as a process)** Article: Aquaporins (report of Nobel prize winning researchers) **(science as a process)**
	Cell Organelles	7	Structure and function of cell organelles; complexity and interdependence of cell organelles to each other (e.g., endomembrane system) **(relationship of structure to function; interdependence in nature)** Timed Essay – Cell Structure
	Cell Cycle, Regulation	12	Role of cell division as the maintenance of diploid chromosome number and distribution of chromosomes to the next generation; mitosis and the cell cycle; regulation of the cell cycle through internal and external cues **(continuity and change)** #3 Mitosis (Part I) – Students observe *Allium* root tips to observe the stages of mitosis and to determine the length of time cells remain in each stage
	Unit Test 2. Cells – Types of Cells, Cell Membranes, Cell Structures, Cell Cycle		
11.6 (8%)	**3. Cellular Energetics**		
	ATP, Chemiosmosis	6, 9	Phosphorylation of molecules to drive endergonic reactions; electron transport coupled to ATP synthesis during chemiosmosis (energy harvest) **(energy transfer)** Timed Essay – Energy Transfer (1995-modified)
	Cellular Respiration	9	Process of cellular respiration (glycolysis, Krebs cycle, electron transport chain), connections to other metabolic pathways; generation of ATP (efficiency compared to anaerobic pathways); structure of mitochondrion as related to process of cellular respiration **(relationship of structure to function; regulation)** #5 Cellular Respiration – Germinating Peas – Students measure the rate of cellular respiration in germinating peas through the measurement of gas volume changes in a respirometer

	Fermentation	9	Process of fermentation (alcoholic and lactic acid) Root Beer Fermentation Lab – Students make root beer from concentrate, yeast, and spring water **(science as a process)**
	Photosynthesis	10	Chloroplasts' structure as related to process of photosynthesis; light reactions and Calvin cycle; chemical energy of ATP and NADPH used to convert CO_2 to sugar; adaptations of plants in arid environments for carbon fixation; photosynthesis as the nutritional foundation for all life forms on Earth **(relationship of structure to function, evolution)** #4 Plant Pigments & Photosynthesis – Students separate plant pigments using paper chromatography, then measure the rate of photosynthesis by observing changes in DPIP (as an electron acceptor) with chloroplasts in differing conditions. Students measure DPIP changes using the Vernier colorimeter apparatus. (science, **technology**, and society)
	Unit Test 3. Cellular Energetics – ATP, Fermentation, Cellular Respiration & Photosynthesis		
II. Heredity & Evolution			
11.6 (8%)	**4. Genetics**		
	Meiosis & Gametogenesis	13, 46	Genes are acquired from parents through the inheritance of chromosomes; sexual and asexual reproduction; sexual life cycles; genetic variation as the basis for evolutionary adaptations **(continuity and change, evolution)** #3 Meiosis (Part II) –Students observe the results of meiotic cell division and the rate of crossover in asci of *Sordaria* (fungi) Timed Essay – Meiosis
	Mendelian Genetics	14	Gregor Mendel's discoveries **(science as a process)**; laws of segregation, independent assortment, dominance; rules of probability; phenotype and genotype; non-Mendelian genetics; pedigree analysis, genetic disorders, genetic testing and genetic counseling **(continuity and change)** M&M Lab – Chi-Square analysis of M&M candies #7 Genetics – Drosophila Lab – Students cross *Drosophila* fruit flies in order to observe life cycles, mutations, and fly cross results; students use Chi-square analysis to interpret cross results. **(science as a process)** Computer Cat Lab – simulation of cat breeding and analysis of offspring Pedigree analysis and discussion of the role of the genetic counselor **(science, technology, & society)** Genetics problem sets

	Chromosomal Inheritance	15	Sex-linkage, chromosomal linkage, linkage maps, pedigrees (stories of Thomas Hunt Morgan and Alfred Sturtevant – readings from Time, Love, & Memory) **(science as a process)** Chromosomal alterations; mtDNA X-linked Inheritance Problem Sets
	Unit Test 4. Heredity – Meiosis, Chromosomes, Mendelian Genetics, Human Heredity		
13 (9%)	**5. Molecular Genetics**		
	Molecular Basis of Genetics	16	DNA as the genetic material, structure of DNA (and nucleotides), replication of DNA Video: Race for the Double Helix **(science as a process)**
	Protein Synthesis, Mutations	17	Transcription, translation; evolution of the genetic code, DNA directing the synthesis of RNA, RNA modification; roles of RNA in a cell; mutations **(evolution)** Protein synthesis simulation lab – CHNOPS
	Viral and Bacterial Genetics	18	Viruses & Bacteria as research organisms Viruses – reproduction (lytic, lysogenic), evolution of viruses from host cells, viroids and prions, discussion of Mad Cow Diseases and its effects on meat industry **(science, technology, & society)** Bacteria – relatively quick adaptations to changing environment, plasmids, modes of genetic recombination in bacteria, discuss operons (lac and trp) Lac Operon model activity – Student groups build a lac operon model with moving parts, present to the class (class votes on best model) Lambda DNA computer activity – the 48,502 base genome found in a Word document can be cut at restriction sites and analyzed for fragment numbers and length using the word processing Word & Character count tools #6A – Transformation Lab – Students transform normal *E. coli* into *E. coli* that can survive on ampicillin plates and that have incorporated the gene for green fluorescence using plasmids containing the glowing DNA and the antibiotic resistance genes; students use sterile lab techniques **(science as a process)**
	Eukaryotic Gene Control	19	Structure of chromatin, DNA packing; control of gene expression through chromatin modification; DNA methylation, histone acetylation **(relationship of structure to function)** A Berry Full of DNA – motivational activity in which students extract DNA from octaploid strawberries

	rDNA, DNA Technology	20	DNA cloning, polymerase chain reactions, restriction enzymes, RFLP analysis, electrophoresis and DNA fingerprinting; DNA technology used in forensic, medical, environmental, and agricultural applications **(science, technology, & society)** #6B – Gel Electrophoresis Lab – Students use electrophoresis equipment to determine the fragment lengths of pre-cut DNA
	Unit Test 5. Molecular Genetics – DNA, RNA, Protein Synthesis, Microbial Genetics, Control, and Biotechnology		
11.6 (8%)	**6. Evolutionary Biology**		
	Evidence for Evolution	22	Charles Darwin's observation and inferences leading to theory of evolution by natural selection, examples of natural selection, Lamarckism, evidence for evolution (homologies, fossils, biogeography) **(science as a process, evolution)** Variation of Grasshopper Legs Lab – Students hypothesize the evolutionary value of variations in the length of grasshopper femurs, then design experiments to test their hypotheses Video: Great Books Series – Origin of Species, with worksheet, and student-constructed timeline of important events in our current understanding of evolution **(evolution)** Timed Essay – Darwin & Evolution
	Mechanisms of Evolution	23, 24	Microevolution (genetic drift and natural selection), changes in allele frequencies, Hardy-Weinberg theory, genetic variation, modes of selection, sexual selection Species, modes of speciation, macroevolution, exaptations; evo-devo – genes that control development help control evolution **(continuity and change, evolution)** #8 Population Genetics & Evolution – Students "mate" in class and apply the principles of the Hardy-Weinberg theory in order to make conclusions about the types of evolution they are observing
	Phylogeny, Classification	25	Geologic time, mass extinctions, taxonomy, phylogenetic trees, cladistics **(continuity and change, evolution)** Computer Activity: How Is Phylogeny Determined Using Protein Comparisons? (Campbell Interactive Activity) Phylogenetic comparisons, cladograms activity

	Evolution of Life on Earth	26	Origin of life, theory of sequence of Earth events: prokaryotic dominance, oxygen in atmosphere, eukaryotic life, endosymbiosis, multicellularity, animal diversity, plants/fungi colonize land, abiotic synthesis of organic compounds, Miller/Urey experiment, three-domain system **(continuity and change, evolution, science as a process)** Coacervates Lab – students "create" life through mixing substances that may have been on primordial earth Video: Great Transformations – with Essay assignment
	Unit Test 6. Evolutionary Biology – Darwin, Evidence for Evolution, Mechanisms of Evolution, Phylogeny/Classification, and Life on Earth		
III. Organisms & Populations			
11.6 (8%)	**7. Diversity of Organisms**		
	Survey of Diversity of Life: Monerans, Protists, Fungi	27, 28, 31	Packet with Early AM discussions/lectures of each Kingdom of Life (on-going for 5 weeks) Lectures focus on the evolutionary diversification of each of these groups of organisms. Phylogenetic trees are used to suggest common ancestors, diversifying features and relationships. Group characteristics are discussed, as are life cycles, and examples of organisms. (While the packet is being completed, regular classwork continues as we study plants – therefore, plants are not part of the packet.) **(continuity and change, evolution)**
	Survey of Diversity of Life: Animals (Invertebrates & Vertebrates)	33, 34	
	Packet Test 7. Diversity of Organisms -- Survey of the Kingdoms		
23.2 (16%)	**8. Structure & Function of Plants**		
	Plant Evolution, Diversity	29, 30	Origin of land plants, adaptations of plants to land, vascularity, seeds, and flowers, major groups; characteristics of all plants and of specific groups of plants, alternation of generations – gametophyte and sporophyte generations **(continuity and change, evolution)** Non-Tracheophytes Lab (Mosses) – Students observe mosses in different stages of their life cycles, observe sexual structures
	Structure/Growth	35	Plant organs, tissues, primary growth and secondary growth, differences between monocots and dicots **(relationship of structure to function)** #9B – Stem Anatomy – Students prepare a cross-section of stem in order to visualize vascular bundle placement

	Transport	36	Mechanisms of transport, structure and functions of xylem and phloem tissue, root absorption adaptations (root hairs, mycorrhizae, endodermis, Casparian strip), transpiration and properties of water to move xylem sap, guard cells, evolutionary adaptations of plants in arid environments, translocation of phloem sap **(relationship of structure to function, regulation)** #9A – Transpiration – Students assemble potometers to test the effects of environmental conditions on transpiration rates in holly stems Investigation of Leaf Stomata – Students make impressions of leaves' lower epidermal layers using Crazy glue to visualize stomata; students predict, then test the effects of stomatal openings in plants Timed Essay – Transpiration and Leaf Structure
	Nutrition	37	Macronutrients and micronutrients required by plants, soil, nitrogen fixation, symbiotic relationships between plants and soil bacteria/fungi, parasitic relationships between plants and other plants; carnivorous plants **(regulation, interdependence in nature)** Nitrogen cycle activity
	Reproduction	38	Review of alternation of generations, flower anatomy, sexual life cycle, pollination and mechanisms to prevent (or provide for) self-pollination, double fertilization as an adaptation to plant energy efficiency, fruit adapted for seed dispersal, asexual reproduction in plants, plant biotechnology **(continuity and change, interdependence in nature)** Flower dissection; Fruit & Seed dissection Demonstration of pollen tube growth (place fresh pollen on microscope slide coated with sugar water or corn syrup; within 30 minutes, some pollen will germinate and begin forming the pollen tube, which is visible under the microscope) "The Flower & the Fly," Natural History – article with questions dealing with the coevolution of angiosperms and pollinators. **(evolution)** Germination Lab – Students germinate *Brassica* seeds lined up on Petri dishes in order to differentiate between growth of epicotyl and radical sections of seedlings
	Plant Responses	39	Plant responses to hormones, light, other stimuli, adaptations and plant defenses against herbivores and toxins **(regulation, evolution)** Tomato Germination Lab – Students investigate the effects of germination inhibitors in tomato pulp and test the effects of those inhibitors on other tomato varieties **(science as a process)**
	Unit Test 8. Evolution, Diversity, Structure, & Function of Plants		

23.2 (16%)	**9. Structure & Function of Animals**		
	Animal Evolution	32	Major trends in Animal Evolution – characteristics of animals, origin of animals from flagellated protists (gastrula-like protoanimal); grades – tissues, symmetry, body cavities, cavities within mesoderm, coelom formation/fate of blastopore; increases in complexity of animals **(continuity and change, evolution)** Computer Activity: How Do Molecular Data Fit Traditional Phylogenies? (Campbell Interactive Activity) – Students use cladistic analysis to compare the body-plan grades of the Animal Kingdom
	Human Evolution	2nd half of 34	Primate evolution – characteristics, environmental changes and early anthropoids, major features of human evolution, hypotheses of the origin of modern humans **(continuity and change, evolution)** Video: Walking Tall & Did Humans Evolve? from PBS Series "Evolution"
	Introduction to Animal Structure & Function	40	Animal form and function, structures of tissues, interdependency of organ systems in an animal; body plans; homeostasis as a method of dealing with environmental change; negative/positive feedback, energy use by animals and metabolic rates **(regulation, relationship of structure to function, energy transfer)** Microscopy of tissue types: epithelial, connective, muscular, nervous Revisit Survey of Animals: Animal Dissection (8 animal survey – sponge, crayfish, starfish, grasshopper, earthworm, clam, perch, & frog – Students dissect animals representing several phyla in order to observe the correlation between structure and function, to observe regulatory mechanisms in animals, and to trace evolutionary patterns in animals
	Animal Nutrition	41	Digestive system structure and function, evolutionary adaptations of vertebrate digestive systems **(relationship of structure to function, evolution)** Tongue dissection – Students examine a beef tongue to determine its relationship to the digestive system Correlative Digestive Systems – Coloring guide Relationship between dentition and diet, length of digestive tract and mode of nutrition Article: Riddle of the Appendix
	Circulation & Gas Exchange	42	Circulation and transport systems in invertebrates and vertebrates, blood, lymph, cardiovascular disease in humans **(relationship of structure to function, science, technology & society)** Gas exchange in invertebrates and vertebrates, gills, tracheal

			systems, book lungs, countercurrent exchange, respiratory pigments **(relationship of structure to function, regulation)** #10 – Physiology of the Circulatory System – Students are subjected to several exercise conditions and blood pressures and heart rates are monitored; students learn to determine blood pressure and heart rate in classmates Students design an experiment to test effects of temperature on heart rate of goldfish; then complete the lab in a manner that is safe for the goldfish. **(science as a process)**
	Unit Test 9a. Animal Structure & Function: Animal Evolution, Nutrition, Circulation & Gas Exchange		
	Immunity	43	Nonspecific defenses – 1st line and 2nd line; Immune system (specific defense – 3rd line of defense) **(regulation)** Video: The Immune System Article: Bacterial Snitch
	Homeostasis & Regulation, Chemical Signals	44, 45	Regulation of body temperature, water balance, nitrogenous wastes as related to habitat; mammalian kidney, nephrons **(regulation, relationship of structure to function)** Endocrine system – chemical signals and how they work Kidney Dissection – students dissect a kidney in order to visualize the renal pelvis, the renal medulla, and the renal cortex Article: Floating Kidneys Endocrine System WebQuest – Teacher produced webquest with student reading about many aspects of the Endocrine System and Disorders of the Endocrine System
	Animal Reproduction & Development	46, 47	Sexual reproduction – internal and external fertilization, mammalian reproduction **(continuity and change, relationship of structure to function)** Early embryonic development Microscope Lab – Images of Ovaries & Testes Human Menstrual Cycle activity – Students are given information regarding the levels of hormones during a woman's reproductive cycle, students graph the phases of the cycle Video: NOVA-The Miracle of Life
	Unit Test 9b. Animal Structure & Function – Immunity, Homeostasis, Chemical Signals, Reproduction & Development		
	Nervous Systems & The Senses/Motor system	48, 49	Types of nervous systems in animals; nerve signals, evolution of the ability of cells to respond to the environment, vertebrate nervous systems, the brain **(regulation, relationship of structure to function)**

			Sensory reception, vision, hearing, taste, smell, movement **(regulation, relationship of structure to function)** Sensory Receptors Lab – Students place hands in warm and in ice water separately, then plunge both into lukewarm water, they describe the feelings; Skin receptors will be tested using the ink-dot grid method and nail tips from hot or cold water
	Animal Behavior	51	Definition of behavior, innate behavior, learning, cognition and social behavior **(relationship of structure to function, interdependence in nature)** #11 – Animal Behavior Lab – Students will design an experiment to measure the effects of environmental variables on animal behavior. Students will use Pill bugs that are placed in a choice chamber in order to determine the insect's preference for wet or dry environments. **(science as a process)**
	Unit Test 9c. Animal Structure & Function – Nervous System, Senses, Animal Behavior		
14.5 (10%)	**10. Ecology**		
	Introduction to Ecology	50	Distribution of organisms, biomes, interactions between organisms and their environment **(interdependence in nature)** Computer Activity: How do Abiotic Factors Affect Distribution of Organisms? (Campbell Interactive Activity)
	Populations	52	What is a population? Population growth, limiting factors, human population and the Earth's carrying capacity, exponential growth vs. Logistic growth models, age-structure pyramids **(interdependence in nature)** Yeast Population Lab – Students grow yeast cultures and analyze population density (through turbidity analysis) from days 1 through 6.
	Communities	53	Interspecific Interactions (symbiotic relationships), food webs, community structure and trophic structures **(interdependence in nature, energy transfer)**
	Ecosystems	54	Primary and secondary production in ecosystems, decomposition as a process depended upon by all life on Earth, nutrient cycling **(interdependence in nature, energy transfer)** Timed Essay – Recycling of Elements in an Ecosystem #12 – Dissolved Oxygen and Aquatic Primary Productivity – Students will measure the amount of oxygen dissolved in natural water samples in order to determine the primary productivity of the sample. Students will use both the Winkler method to measure dissolved oxygen, and the Light/Dark bottle method to compare dissolved oxygen values in water samples exposed to different light conditions

	Conservation Biology	55	Levels of Biodiversity, conserving species, habitat destruction **(interdependence in nature, science, technology & society)** Ecotourism: Who Benefits? Students assess ecotourism in Costa Rica by considering viewpoints of several interested parties. They are to develop a strategy that can provide a balance between the ecotouring company and the delicate ecosystem.
	Unit Test 10. Ecology – Populations, Communities, Ecosystems, and Conservation Biology		
	AP Exam Review Student groups will complete questions from each section of the Annotated Course Outline and review the objectives and outcomes of one or two labs. For the 2 weeks prior to the AP exam, student groups will present their portion of the review as the class takes notes.		

Important Considerations

The course provides students with an opportunity to develop a conceptual framework for modern biology emphasizing:

- an understanding of science as a process rather than an accumulation of facts:

  As students complete lab assignments and classroom activities, they are required to complete analysis and discussion questions regarding the activity. These questions lead the student to demonstrate an understanding of how this process or model or laboratory is used to describe the concept being investigated. Further, students are expected to describe changes they would make in the lab, limitations to the data collection, and applications of the information in the activity to biological concepts. Students are further expected to be able to write about their understanding of the process through essay practice and through formal laboratory reports. Additionally, students are encouraged to discuss their findings with their peers, and to debate questions, posed by the teacher or by other students, as they relate to the content of the course.

- recognition of evolution as the foundation of modern biological models and thought:

  Each and every topic discussed in class includes an evolutionary component – how that process or structure or function is an adaptation for the organism. Students start to think of life processes in an evolutionary context rather than as a system built to work. Phylogenetic trees and cellular/molecular homologies are discussed in every unit. For example, the genetic code is the same in prokaryotes as it is in eukaryotes, indicating evidence of common origin for all organisms. Similarities in the way prokaryotes divide and in the way mitochondria divide offers evidence for the theory of endosymbiosis.

- the integration of the general topics of biology through the eight major themes as specified in the Course Description:

  I have **annotated** throughout my syllabus where many of the eight major themes of biology are addressed within the general topics of biology. Please see syllabus.

- and applications of biological knowledge and critical thinking to environmental and social concerns:

My students are given several opportunities to apply their biological knowledge and critical thinking to environmental and social concerns. Students review and discuss the effects of childhood obesity during our unit on nutrients (organic compounds), the pros and cons of energy drinks (energy transformations), pedigree analysis and the role of the genetic counselor (genetics), genetic disorders (genetics), human disease (several human systems), and the assessment of ecotourism in Costa Rica (ecology)

The course includes a laboratory component that fulfills all of the objectives of the recommended AP Biology labs as listed in the Course Description. Students must spend a minimum of 25% of instructional time engaged in hands-on laboratory work.

This course meets every day for the entire school year for 84 minutes each day – it is a two-credit course. Students spend from one to three periods each week engaged in hands-on laboratory activities. Each of the "dirty dozen" required AP Biology labs is completed in class as hands-on, "wet"-labs, as are several peripheral laboratory activities. Therefore, approximately 65 hours of class time is spend in hands-on laboratory activities, out of the total 217 hours contact time, giving the class a no-less-than 30% laboratory experience.