TAKOMA ACADEMY

AP Biology Syllabus (2019-2020)

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Course Overview

The AP Biology course is a fast paced, rigorous, and fun course designed to be the equivalent of a two-semester college introductory course usually taken by Biology majors their first year. Success in this course will depend on your study skills, reading and writing abilities, motivation, and maturity. Students are engaged in student-directed investigation during the 25 percent of instructional time devoted to laboratory work. Students will conduct a minimum of eight inquiry-based investigations (two per big idea throughout the course). All levels of inquiry will be used, and all seven science-practice skills will be used by students on a regular basis in formal labs as well as activities outside of the lab experience. Students will maintain a laboratory notebook or portfolio throughout the course that documents all of their laboratory investigations. At the end-of-year, students will write a reflective statement based upon their written lab reports describing the scientific skills gained throughout the year.

Instructional Resources

Urry, Cain, Wasserman, Minorsky, Jackson, Reese Campbell, **Biology in Focus** Pearson, 2014.

AP Biology Investigative Labs: An Inquiry-Based Approach. New York: The College Board, 2012 at http://www.collegeboard.com/html/apcourseaudit/courses/pdfs/cb-biology-lab-manual-1-24-12.pdf

Your Inner Fish

Pearson Website at www.campbellbiology.com

Learn.Genetics at http://learn.genetics.utah.edu

Bozeman science: http://www.bozemanscience.com/ap-biology/

NOVA | *Cracking the Code of Life* - PBS

NOVA/Sciencenow: http://www.pbs.org/wgbh/nova/sciencenow/

Welcome to Evolution 101! - Understanding Evolution

Unlocking the Mystery of Life

Intelligent Design on Trial:
http://www.pbs.org/wgbh/nova/evolution/intelligent-design-trial.html

AP Biology Test Prep Series
https://www.pearsonhighered.com/product/Reece-Preparing-for-the-Biology-AP-Exam-School-Edition-5th-Edition/9780133458145.html

Course Materials

You will be required to have a notebook that will be used for AP Biology Labs. In addition, it is recommended that you have a 3-ring binder, specifically for AP Biology, with dividers for: Notes, Labs, Tests, Vocabulary, etc. An AP Biology textbook will be provided for you to use. The textbook should come to class with you every day in addition to your Lab Notebook and AP Biology 3-ring binder.

Topical Outline For The Year

The AP Biology Curriculum is framed around four "Big Ideas", the enduring understandings within each big idea and the essential knowledge within the enduring understandings. The course is also structured around inquiry in the lab and the use of the seven science-practices. Below is an outline of the AP Biology Curriculum's "Big Ideas" and the "Enduring Understandings" covered in this course.

Big Ideas	Enduring Understanding
# 1. The process of evolution drives the diversity and unity of life.	A. Change in the genetic makeup of a population over time is evolution. B. Organisms are linked to each other through lines of descent from common ancestry. C. Life continues to evolve within a changing environment. D. The origin of living systems are explained by natural processes
# 2 Biological systems utilize energy and molecular building blocks to grow, reproduce, and maintain homeostasis.	A. Growth, reproduction, and maintenance of the organization of living systems require free energy and matter. B. Growth, reproduction, and dynamic homeostasis require that cells create and maintain internal environments that are different from their external environments. C. Organisms use feedback mechanisms to regulate growth and reproduction, and to maintain dynamic homeostasis. D. Growth and dynamic homeostasis of a biological system are influenced by changes in the system's environment. E. Many biological processes involved in growth, reproduction, and dynamic homeostasis include temporal regulation and coordination.
# 3 Living systems	A. Heritable information provides for continuity of life. B. Expression of genetic information involves cellular and

store, retrieve, transmit, and respond to information essential to processes of life.	molecular mechanisms. C. The processing of genetic information is imperfect and is a source of genetic variation. D. Cells communicate by generating, transmitting, and receiving chemical signals. E. Transmission of information results in changes within and between biological systems.
# 4 Biological systems interact, and these interactions possess complex properties.	A. Interactions within biological systems lead to complex properties. B. Competition and cooperation are important aspects of biological systems. C. Naturally occurring diversity among and between components within biological systems affects interactions with the environment.

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Science Practices (SP)

1. The student can **use representations and models** to communicate scientific phenomenon and solve scientific problems.
2. The student can **use mathematics** appropriately.
3. The student can **engage in scientific questioning** to extend thinking or to guide investigation within the context of the AP course.
4. The student can plan and implement **data collection** strategies appropriate to a particular scientific question.
5. The student can **perform data analysis** and evaluation of evidence.
6. The student can work with **scientific explanations** and theories**.**
7. The student is able to **connect and relate knowledge** across various scales, concepts and representations, in and across domains.

Course Schedule

Unit 1: Introduction, Biological Change (6 weeks)

Enduring Understandings: 1A, 1B, 1C, 1D, 2D, 3C, 4A, 4B, 4C

Introduction: Scientific Method and Chi Square Test

1. **Lab: The Chi-square Test (Probability, and Random Chance. (SP #'s 2, 4, 5)**
2. **AP Biology Investigative Labs (2012), *Investigation 12: Fruit Fly Behavior. (SP #'s 1, 3, 4, 5, 6, 7***

Selection and Speciation: Big Ideas 1, 3, 4

1. After viewing the video "Essential Characteristics of Life", students justify the claim that organisms share many core processes and features that are widely distributed among organisms, what these common features reveal about how

life might have arisen on Earth, and compare your view with Darwin's view. ***(LO 1.15, 1.16)***

2. Support one of the following statements with evidence using a well written paragraph that supports the 4 postulate of natural selection.
    - ***a.*** Environments change and act as selective mechanisms on populations. **(LO 1.5*)***
    - ***b.*** Some phenotypic variations significantly increase or decrease fitness of the organism and the population. **This assignment connects Big Idea 4 and enduring understanding 4C to Big Idea 1. (LO 4.26)**
    - ***c.*** Humans impact variation in other species***.*** **This assignment connects Big Idea 4 and enduring understanding 4B to Big Idea 1** ***(LO 4.21)***
3. Distinguish between the following using examples of selection.
    - ***a.*** Artificial and natural selection using an organism of choice. **(LO 1.2, LO 1.8)**
    - **b.** Directional, stabilizing, and disruptive selection **This assignment connects Big Idea 3 and enduring understanding 3C to Big Idea 1 (LO 3.26)**
4. Explore newspaper articles that support the statement that populations of organisms continue to evolution. **(LO 1.26)**
5. Explain each of the three isolating mechanisms (barriers to gene flow) with examples and classify each as to which type of speciation that results: allopathic speciation or sympatric speciation. **(LO 1.24)**
6. Discuss the following symbiotic relationships among organisms that develop by coevolution. **This assignment connects Big Idea 4 and enduring understanding 4B to Big Idea 1. (LO 4.18)**
    a. Rough-skinned newt and garter snake
    b. Acacia tree and acacia ant
    c. Orchid and moth
    d. Leaf cutter ant and fungus
7. Support the concept of adaptive radiation using either Darwin's finches OR the Honeycreeper's of Hawaii as examples. **(LO 1.25)**
8. Predict what happens to the genetic make-up of small populations as a result of genetic drift, migration and artificial selection. **(LO 1.8)**

Speciation and Extinction: Big Ideas 1, 2, 4

1. Using Hardy-Weinberg equilibrium equations, determine the allelic and phenotypic frequencies of non-evolving populations. ***(LO 1.3)***
2. **AP Biology Investigative Labs (2012), Investigation 2: Mathematical Modeling: Hardy Weinberg . This laboratory experience connects Big Idea 1 and enduring understanding 1.A to Big Idea 4. (SP #'s 1, 2, 5)**
3. **AP Biology Investigative Labs (2012), Investigation 3: Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST This activity connects Big Idea 1 and enduring understanding 1.B to Big Idea 4. (SP#'s 1, 5, 3)**

4. Provide evidence that speciation and extinction have occurred throughout Earth's history. **This assignment connects Big Idea 4 and enduring understanding 4.B to Big Idea 1. (LO 1.20)**
5. Provide evidence from the following disciplines that support biological evolution: **(LO 1.12)**
    a. Biogeography
    b. Fossils
    c. Comparative anatomy
    d. Comparative embryology
    e. Molecular biology
6. Support the following statement with evidence: "Organisms have various mechanisms for obtaining nutrients and eliminating wastes, and transporting them and these mechanisms are said to support common ancestry". **This activity connects Big Idea 1 and enduring understanding 1.B to Big Idea 2. (LO 2.25).**
7. Create phylogenetic trees to best represent evolutionary relationships among different organisms. **(LO 1.19)**
8. Discuss the "heterotroph theory" and the "RNA World hypothesis" and their evidences (chemical, molecular and genetic). **(LO 1.27)**

Unit 2: Cells and Energy (9 weeks)

Enduring Understandings: 1C, 2A, 2B, 2C, 4A

Energy and Matter: Big Idea 1, 2, 4

1. Draw a representation of the structure of the ATP molecule, and explain how energy can stored in ATP and released by hydrolysis to ADP + P via the ATP-ADP cycle (an example of coupled reactions). **This activity connects Big Idea 2 and enduring understanding 2.A to Big Idea 4. (LO 4.2)**
2. Students explain various strategies used by different organisms to regulate body temperature and metabolism (endothermy and ectothermy) and describe how endothermy allowed for radiation of animals into diverse environments. . **This activity connects Big Idea 1 and enduring understanding 1.C to Big Idea 2. (LO 2.2).**
3. Students create an illustration tracing the path of a carbon atom from the air into a plant during photosynthesis and then follow the journey of the same carbon atom from an extinct dinosaur and into a modern human through food webs (e.g., carbon cycle). ***This illustration connects Big Idea 2 and enduring understanding 2.A to Big Idea 4. (LO 4.15)***
4. Students are assigned a water property to depict as a superhero for a comic strip. They create and draw a five-panel comic strip that illustrates and explains the important role water has in biological systems. Students will explain and present their water superheroes on the wall for me, and their peers, to view **(LO 2.9*)***

5. Students develop a representation or model to illustrate how different polymers function in various biological processes. ***This activity connects Big Idea 2 and enduring understanding 2.A to Big Idea 4.*** **(LO 4.2*).***
6. Students support the statement that the subcomponents of biological molecules and their sequences determine the properties of that molecule (Nucleic acids, proteins, lipids, and carbohydrates. ***This activity connects Big Idea 2 and enduring understanding 2.A to Big Idea 4.*** **(LO 4.1)**.
7. Students support the statement that bonding between carbohydrate subunits determine their relative orientation in the carbohydrate, which in turn, determines the secondary structure of the carbohydrate. ***This activity connects Big Idea 2 and enduring understanding 2.A to Big Idea 4.*** **(LO 4.1)**.
8. **Lab: Foods (SP #'s 3, 4, 5)**

Cells and Membrane Transport: Big Idea 1, 2

1. Students describe the effect does the SA/volume ratio have on cell functioning, and how does this ratio affect the size of cells?
2. Students review micrograph pictures of bacteria, plant, and animal cells, (Home of *CELLS alive*!) making comparisons and contrasts of the bacterial, plant and animal cells **(LO 2.14*)***
3. Students identify the functions of the various cell organelles in eukaryotic cells and why cells compartmentalize these structures in membranes. (**LO 2.13)**
4. Students draw a model of organelles involved in helping a plant obtain a constant input of free energy and identify the evolutionist's evidences that mitochondria and chloroplasts evolved from free-living organisms. (See Endosymbiosis hypothesis at the website: **http://evolution.berkeley.edu/evolibrary/article/history_24).**

This activity connects Big Idea 2 and enduring understanding 2.A to Big Idea 1. (LO 1.9)

5. Students identify the functions of the cell wall in plants, and describe the cell membrane as a fluid mosaic of a variety of different molecules having differing functions within the membrane. **(LO 2.10)**
6. **AP Biology Investigative Labs (2012), *Investigation 4*: Diffusion and Osmosis (SP #'s 1, 2, 3, 4, 5, 6)**
7. Students draw a model illustrating four different mechanisms of membrane-transport**. (LO 2.11)**

Cell Energy: Big Ideas 2, 4

1. Students explain various strategies that organisms use to capture and store free energy for use in biological processes (autotrophy, heterotrophy, etc. **(LO 2.2).**
2. In teams, students create a visual representation (e.g., poster) to explain the interdependent relationships of cellular respiration and photosynthesis, and how the processes of cellular respiration and photosynthesis affect a runner in a marathon race. Students should use few words and focus on using graphics to represent the cyclic processes. (LO 2.4, 2.9)
3. Draw a representation of the anatomy of a leaf, structure of chloroplast, the absorption spectrum of photosynthesis**, and identify the** pigments of photosynthe **This activity connects Big Idea 2 and enduring understanding 2.A to Big Idea 4. (LO 4.6)**
4. Students will be able to contrast cyclic and non-cyclic phosphorylation in terms of its final electron acceptor, photosystems used and reactants required and products produced and why does cyclic phosphorylation continue to exist? (i.e.. when do plants utilize this mechanism?) **(LO 2.5)**
5. Draw a representation of the Calvin cycle, explaining its products and its relationships to the light reactions. **(LO 2.5)**
6. **AP Biology Investigative Labs (2012), *Investigation 5*: Photosynthesis in leaf (SP #'s 1, 2, 3, 6, 7)**
7. Students explain photorespiration and how CAM plants and C4 plants solve the problem of photorespiration. **(LO 2.5)**
8. Draw a representation of the structure of the mitochondria, identify the reactants and products of aerobic respiration, the reactants and products and energy yield of ATP in **each step,** the total energy yield for aerobic respiration, the 2 electron carriers, and the final electron acceptor in aerobic respiration. **This activity connects Big Idea 2 and enduring understanding 2.A to Big Idea 4. (LO 4.6)**
9. **AP Biology Investigative Labs (2012), *Investigation 6*: Cellular Respiration (SP #'s 1, 2, 3, 6, 7)**
10. Describe chemiosmosis in photosynthesis and respiration AND compare and contrast photosynthesis and aerobic respiration in terms of reactants, products, where in cells they occur, and their mechanisms (chemiosmosis, and electron transport chain, electron donor, final electron acceptors) **(LO 2.5*)***
11. Students compare and contrast alcoholic fermentation and lactic acid fermentation in terms of substrate involved, how it is accomplished, energy yield, products formed, and types of organisms undergoing each. **This activity connects Big Idea 2 and enduring understanding 2.A to Big Idea 4. (LO 4.6)**
12. Compare and contrast cellular respiration and fermentation in terms of reactants, products, requirements, energy yield, and energy-related pathways. **This activity connects Big Idea 2 and enduring understanding 2.A to Big Idea 4. (LO 4.6)**

Dynamic Homeostasis: Big Ideas 2, 4

1. Students compare and contrast negative and positive feedback mechanisms, give examples of each, and describe conditions that result from loss of homeostatic control. **(LO 2.16, 2.20)**
2. Compare and contrast the non-specific and specific immune systems in terms of the cells involved, the chemicals involved, and any organs that may be involved, the speed of the immune response. **(LO 2.29, 2.30)**
3. Compare and contrast humoral immunity and cellular immunity.
4. Describe how cellular activities are affected by biotic and abiotic factors (Biofilm). **This activity connects Big Idea 2 and enduring understanding 2.D to Big Idea 4. (LO 4.22)**

Unit 3: Genetics and Information Transfer

Enduring Understandings: 1A, 1C, 2C, 2E, 3A, 3B, 3C, 3D, 3E, 4C

Molecular Basis of Inheritance: Big Ideas 3

1. Students review the experimental design or designs leading to the demonstration that DNA is the genetic material for all living organisms on Earth. **(LO 3.2).**
2. Describe differences between the DNA of prokaryotes and eukaryotes
3. "DNA replication ensures continuity of heritable information". Support this statement, beginning with a description of DNA replication. In your description, include replication as a semiconservative process, the antiparallel structure of DNA, the function of the enzymes helices, DNA polymerase, single-strand binding protein, RNA primase, and DNA ligase AND the difference between the leading strand and the lagging strand, and Okazaki strands. **(LO 3.3)**
4. *A Science Odyssey: You Try It: DNA Workshop* - PBS. Students compare DNA replication and RNA transcription following the rules of base pairing. **(LO 3.3, and 3.4)**
5. Genetic information flows from a sequence of nucleotides in a gene to a sequence of amino acids in a protein. Support this statement, beginning with an explanation of RNA transcription and RNA translation. Your description needs to include the function of RNA polymerase, RNA modifications taking place after transcription, three types of RNA, descriptions of a codon and anticodon, start and stop sequences, amino acids and polypeptides. **(LO 3.4)**

6. Students create a presentation comparing HIV to other viruses and their methods of replication. ***(LO 3.1)***
7. **AP Biology Investigative Labs (2012), Investigation 8: Biotechnology: Bacterial Transformation (SP#'s 2, 3, 4, 5, 6, 7)**
8. Justify the claim that humans can manipulate heritable genetic information by identifying and explaining at least two commonly used technologies. **(LO 3.5)**
9. Students discuss the ethics of human genetic engineering OR students create PowerPoint presentations to distinguish between embryonic versus adult stem cells and explain (with justification) their arguments for and against stem cell research. ***(LO 3.13)***

Transfer of Genetic Information: Big Ideas 1, 3

1. Students evaluate and explain differences and similarities between mitosis and meiosis as to their relation to genetic diversity and biological change, and role of each, number of divisions and number of cells formed, chromosome number, and type of cells involved. ***This study connects Big Idea 1 and enduring understanding 1.C to Big Idea 3.*** **(LO 3.9)**

2. Students construct a model of the cell cycle, explain and present the major events, and estimate the time a cell spends in each of the stages and develop an appropriate graph to reveal the data as part of the presentation. **AND d**escribe how the cell cycle is regulated (include the role of cyclins, CDK, and MPF in your explanation) **(LO 3.8)**
3. **Lab: Cancer and the Loss of Cell Cycle**
4. **AP Biology Investigative Labs (2012), Investigation 7: Cell Division-Mitosis (SP #'s 1, 5, 6, 7)**
5. Discuss the events of each of major phases of mitosis and cytokinesis and the value (uses) of mitosis to living things. What happens when mitosis goes awry? **(LO 3.9)**
6. **Lab: Environmental Effects on Mitosis**
7. **AP Biology Investigative Labs (2012), Investigation 7: Cell Division-Meiosis (SP #'s 1, 5, 6, 7)**
8. Describe the major stages of meiosis and describe the three main sources of genetic variation in future generations as a result of sexual reproduction and meiosis ***This activity connects Big Idea 1 and enduring understanding 1.A to Big Idea 3.*** **(LO 3.10)**
9. "Biological systems (viruses and prokaryotes) have multiple processes that increase genetic variation without sexual reproduction, necessary for biological change". Support the statement with evidence. ***This activity connects Big Idea 1 and enduring understanding 1.A to Big Idea 3. (LO 3.28, 3.30)***
10. **Lab: Meiosis in Sordaria.** (**SP #'s 2, 5)**

11. Compare gametogenesis in males and females. **(LO 3.12)**
12. **S**tudents analyze the phenotypic changes that result when DNA sequences are altered, or as a result of frame shift mutations. **This activity connects Big Idea 1 and enduring understanding 1.C to Big Idea 3. (LO 3.24. LO 3.25)**
13. Students write a report questioning the ethics of genetic screening (e.g., Huntington's disease, cystic fibrosis, PKU) OR create PowerPoint presentations distinguishing between embryonic versus adult stem cells OR discuss the ethics associated with the acquisition of HELA cells ***(LO 3.13)***

Chromosomal Basis of Inheritance: Big Ideas 1, 3, 4

1. How does the chromosome of eukaryotes differ from the chromosomes of prokaryotes? **(LO 4.6)**
2. Students will solve monohybrid and dihybrid genetic crosses and explain the 9-3-3-1 ratio (instead of the expected 3:1 ratio) in his dihybrid cross (RrYy X RrYy)? **(LO 3.14).**
3. Students will explain the observed 17% recombinant phenotypes and 83% parental phenotypes instead of the expected 50% recombinant phenotypes to 50% parental phenotypes in a test cross involving Drosophila, and what the following means: 17% recombinant and a 50% recombinant. **(LO 3.12)**
4. Students will predict the sequence of genes on a chromosome based upon the frequency of crossing over that occurs between them. ***(LO 3.14)***
5. Explain and/or solve genetics problems that deal with deviations from Mendel's model of the inheritance of traits: sex-linkage, incomplete dominance, codominance, multiple alleles, polygenic inheritance, x-inactivation, non-nuclear inheritance***). (LO 3.15)***
6. **S**tudents analyze the phenotypic changes that result when chromosome numbers in organisms are altered or specific chromosomal changes occur **This activity connects Big Idea 1 and enduring understanding 1.C to Big Idea 3. (LO 3.24, LO 3.25)**
7. Solve pedigree charts for probability of a child inheriting a recessive trait. **(LO 3.14)**

Gene (and Temporal) Regulation and Gene Expression: Big Ideas 2, 3, 4

1. Explain how cells differentiate, that is, how do they "decide" what cells they are to become? Describe the role of the SRY transcription factor. Describe the role of heat shock factor protein. **(LO 3.34)**
2. Students use construction paper or other creative materials to construct models of the lac and/or tryp operons that include a regulator, promoter, operator, and structural genes. Students use the model to make predictions (with justification) about the effects of mutations in any of the regions on gene expression. ***(LO 3.21, 3.23/SP #'s 1,4, 6)***

3. Students discuss how environmental factors affect the expression of genes in the Himalayan rabbit and arctic fox. **This activity connects Big Idea 4 and enduring understanding 4.C to Big Idea 3. (LO 3.19)**
4. Justify scientific claims that timing and coordination of specific intercellular and intracellular events necessary for normal development in organisms (seed germination in plants, ripening of fruit, cell differentiation, embryonic induction, apoptosis, developmental patterns and sequences, male sexual development, metabolic gene expression in bacteria, and cell replication and division) and are regulated by multiple mechanisms. **(LO 2.33, 2.37)**
5. Summarizing some mechanisms of timing and coordination of physiological events in plants, animals, and bacteria. **(LO 2.21)**
6. Discuss each of the following responses of plants and animals to environmental information and its affect on natural selection: phototropism, photoperiodism, sexual selection, and cooperation (pollination). **(LO 2.38)**

Communication: Big Ideas 2, 3

1. Construct an explanation, with appropriate examples, that describe how cells communication occurs by direct contact AND from a distance through chemical signaling. **(LO 3.34)**
2. Amazing Cells - Genetic Science Learning Center - University of . During this activity, students will: View a 3-D animation for cell communication, the fight or flight response. Examine an in-depth view of how cells communicate during a fight or flight response. Engage in an interactive exploration called "Dropping Signals." Learn what happens when cell communication goes wrong. Look at the inside story of cell communication. **This activity connects Big Idea 2 and enduring understanding 2.E to Big Idea 3. (LO 3.37)**
3. Identify the functions of various animal and plant hormones. **(LO 3.34)**
4. Construct an explanation or a representation or appropriate model using cutout pieces of construction paper to illustrate the key features/components that expresses the key elements of signal transduction pathway that include a regulator, promoter, operator, and structural genes by which a signal is converted to a cellular response**. This activity connects Big Idea 2 and enduring understanding 2.E to Big Idea 3.** ***(LO 3.36/SP #'s 1,4, 6)***
5. Construct an explanation of how certain chemical, such as adenylate cyclase affect the signal transduction pathway in humans. ***(LO 3.37)***

6. Create a visual representation or describe how the complex nervous system detect external and internal signals, transmit them and integrate information, and produce response. **(LO 3.47)**
7. Students describe how organisms (bees, wolves, sage grouse) exchange information in response to internal changes or environmental cues. **(LO 3.42)**

Unit 4: Systems

Enduring Understandings: 1C, 2C, 2D, 4A, 4B, 4C

Interactions and Coordination: Big Ideas 4

1. Support the statement, with evidence and justification, that "interactions and coordination between organ systems provide essential biological activities." **(LO 4.8)**
2. Support the statement, with evidence and justification, that "interactions and coordination between organ provide essential biological activities."
3. **AP Biology Investigative Labs (2012), Investigation 11: Transpiration**
   Science practice skills: #'s 1, 2, 4, 6, 7
4. Describe how populations interact in an ecosystem. **(LO 4.8)**
5. Describe the structure of a community in terms of species composition, species diversity, AND population growth patterns and interactions. **(LO 4.13)**
6. Explain how ecosystems interact with biotic and abiotic factors in the environment. Include in your explanation examples of food chains and food webs, and how limiting factors lead from exponential growth to logistic growth. **(LO 4.15)**
7. Provide evidence that ecosystems change over time. Include in your explanation how global climate change will impacts ecosystems around the

planet and how continental drift created climatic changes that impacted mammal species. **(LO 4.20)**

7. Students debate the evidence of human causation of climate change. ***(LO 4.21).***

Cooperation, Variation, and Diversity: Big Ideas 1, 2, 4

1. Explain the importance of cooperation in living systems: how microscopic cells cooperate in the rumen of a cow, how organelles cooperate in a cell, and how organs cooperate in the digestive system. (**LO 4.18)**
2. Students develop a model to illustrate how abiotic factors influence the function of polymeric molecules (e.g., enzymes. **(LO 2.22*)***
3. **AP Biology Investigative Labs (2012), <u>Investigation 13:</u> Enzyme activity. (LO 2.22) (SP: #'s 4, 5, 6, 7)**
4. Using enzymes, discuss how molecular variation in cells can affect the fitness at the local level. **(LO 4.22)**
5. "Cooperative behavior within and between populations, contribute to the survival of the population". Support the statement with evidence. **(LO 4.19)**
6. Describe the importance of variation in population. ***This study connects Big Idea 1 and enduring understanding 1.C to Big Idea 4 (interactions). (LO 4.26)***
7. Explains the importance of biodiversity (genetic or ecosystem diversity) and the importance of keystone species in an environment and gives two examples of keystone species. **(LO 4.27)**
8. Students identify an invasive species in their community and design a plan to investigate its impact. ***(LO 4.19, LO 4.21)***
9. Regulatory mechanisms are studied at various levels of organization from the molecular to the organismal and the ecosystem level. Research and report on the effects of thalidomide on human development***. This study connects Big Idea 2 and enduring understanding 2.C (maintain homeostasis) to Big Idea 4 (interactions).***

AP Biology Exam

The exam is 3 hours long and includes both a 90-minute multiple-choice section (63 multiple choice and 6 grid-in questions) and an 80-minute free-response section (6 short and 2 long essay style questions) that begins with a mandatory 10-minute reading period. The multiple-choice section accounts for half of the student's exam grade, and the free-response section accounts for the other half.

Course Policies/Expectations

Students are expected to read required chapters in textbook prior to class discussion. **KEEPING UP WITH THE READING IS VERY IMPORTANT!**

If you are absent the day of a test, your make-up will be different and may contain more essay questions.

Be prepared for an unannounced quiz over reading assignments at any time.

Students should expect to complete a **MINIMUM** of 5-10 hours of study

OUTSIDE of class each week. **Students taking multiple AP courses should be aware of the time commitment required by each.**

Due to the rigor of this course, attendance is essential for understanding. Students must be in class and on time each day.

Grading

Students will be assigned homework regularly, including text readings, practice questions from the textbook and other sources, and old AP free response practice questions, etc. Unit exams will be comprised of multiple choice questions as well as free response questions. Grading will be based upon the following scale:

4	A	3.7	A-	3.3	B+
3	B	2.7	B-	2.3	C+
2	C	1.7	C-	1.3	D+
1	D	0.7	D-		

Late Work

Learning to budget your time and meet deadlines is a valuable job/life skill, which students will need in the "real world". Late work is NOT accepted unless prior arrangement has been made. Even then, a penalty may apply. **Once a unit is finished and assessed, homework and labs from that unit WILL NOT BE ACCEPTED.**

Make-up Work

It is your responsibility to arrange for completing work, if you were absent. If YOU KNOW IN ADVANCE you will be gone, you must arrange to complete work BEFORE the absence. Students MUST arrange with me outside of class time a schedule for turning in missed work the first day upon their return from an excused absence. In the absence of such arrangement, the school policy will be followed. Work missed due to unexcused absences will result in a score of zero. If a lab is missed, students may write a two-page report on the same material covered in the lab, if they choose to do so instead of making up the lab, otherwise, the labs should be made up after the regular school day.

****Changes to the syllabus may occur throughout the semester if they become necessary****

Please sign and return the portion of the syllabus below. By returning this signed syllabus, you are indicating that you have read and understand the policies outlined in the syllabus above.

Student Name:

Student Signature: Date:

Parent/Guardian Name:

Parent/Guardian Signature Date

Parent/Guardian phone number: Parent/Guardian Email Address: