



**AP Biology**  
**Year at a Glance (YAG)**  
**2024-2025**



First Semester		Second Semester	
1 <sup>st</sup> Nine Weeks		3 <sup>rd</sup> Nine Weeks	
<p><b>Big Idea 2:</b> 2B1, 2B2, 2B3, 2C1, 2C2, 2E2</p> <p><b>Big Idea 3:</b> 3D1, 3D2, 3D3, 3D4, 3E1</p> <p><b>Big Idea 4:</b> EK: 4A1, 4A2, 4A3, 4A4, 4C1, 4B4, 4C3, 4C4</p>	<p><b>Unit 1 : Chemistry of Life: Biochemistry</b> <b>Identify</b> the 6 major elements found in living things. Describe the role of carbon in molecular diversity, its characteristics, and its forms of organization structures. <b>Define</b> monomer, polymer, hydrolysis, and dehydration synthesis and give specific examples from each of the 4 macromolecule groups. <b>Distinguish</b> between endergonic/exergonic reactions, anabolic/catabolic pathways, kinetic/potential energy, and open/closed systems. <b>Describe</b> an enzyme in terms of its function in chemical reactions and substrate/product relationships.</p> <p><b>Unit 2: Cell Structure and Function</b> <b>Identify</b> the structure, composition, and function of cell organelles. <b>Compare and contrast</b> the structures of eukaryotic and prokaryotic cells. Identify the components of the fluid mosaic model of the cell membrane. <b>Compare</b> isotonic (isosmotic), hypertonic (hyperosmotic), and hypotonic (hypoosmotic) solutions and predict the path of movement of water and solutes in given examples. <b>Relate</b> osmotic potential to solute concentration and water potential. <b>Describe</b> the three main stages of cell signaling. <b>Describe</b> how signal information is transduced into cellular responses in the cytoplasm and in the nucleus.</p>	<p><b>Big Idea 1:</b> 1A1, 1A2, 1A3, 1A4, 1C2, 1C3, 1D1, 1D2</p> <p><b>Big Idea 2:</b> 2C1, 2C2, 2D1, 2D2, 2D3, 2D4, 2E1, 2E2, 2E3</p> <p><b>Big Idea 3:</b> 3A1, 3B1, 3B2, 3C2, 3C3</p> <p><b>Big Idea 4:</b> 4C2</p>	<p><b>Unit 5: Heredity</b> <b>Describe</b> Mendel's law of segregation.. <b>Distinguish</b> between genotype and phenotype, heterozygous and homozygous, dominant and recessive traits. <b>Use</b> the laws of probability to calculate the chances of an individual having a specific genotype or phenotype. <b>Complete</b> genetics problems related to the condition and patterns of inheritance discussed. <b>Understand</b> the use of the Chi Square test in studying data from genetic crosses.</p> <p><b>Unit 6: Gene Expression and Regulation</b> <b>Describe</b> the structure of DNA and explain what kind of chemical bond connects the nucleotides of each strand and what holds the two strands together. <b>Describe</b> the process of DNA replication. <b>Explain</b> the processes of transcription, translation and mRNA editing. Given a sequence of bases in DNA, <b>predict</b> the corresponding codons transcribed on mRNA and the corresponding anticodons of tRNA. <b>Explain</b> how the genetic code is redundant and universal. Using the <i>trp operon</i> as an example, <b>explain</b> the concept of an operon and the function of the operator, repressor and corepressor. <b>Distinguish</b> between structural and regulatory genes. <b>Describe</b> the <i>lac operon</i> functions. <b>Understand</b> how restriction enzymes and gel electrophoresis are used to isolate DNA fragments</p> <p><b>Unit 7: Natural Selection</b> <b>Students will be able to:</b> <b>State</b> the two major points Darwin made in <i>The Origin of Species</i> concerning the Earth's biota. <b>Explain</b> what Darwin meant by the principle of common descent and "descent with modification". <b>Explain</b> what evidence convinced Darwin that species change over time. Using some contemporary examples, <b>explain</b> how natural selection results in evolutionary change.</p>



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2 <sup>nd</sup> Nine Weeks		4 <sup>th</sup> Nine Weeks	
<p><b>Big Idea 2:</b> 2A1, 2A2, 2A3, 2C1, 2C2, 2D1, 2D2, 2D3</p> <p><b>Big Idea 3:</b> 3A1, 3A2, 3A3, 3A4, 3C1, 3C2</p>	<p><b>Unit 3: Cellular Energetics</b> <b>Describe</b> the role of respiration in the cell's energy cycle. <b>Define</b> cellular respiration, glycolysis, citric acid cycle, and electron transport. <b>Identify</b> the general reactants and products of glycolysis, citric acid cycle and oxidative phosphorylation. <b>Compare</b> the end products of aerobic and anaerobic respiration and identify the types of organisms employing each. <b>Summarize</b> the light reactions with an equation and describe where they occur. <b>Describe</b> important differences in chemiosmosis between oxidative phosphorylation in mitochondria and photophosphorylation in chloroplasts. <b>Summarize</b> the carbon-fixing reactions of the Calvin-Benson cycle and describe changes that occur in the carbon skeleton of the intermediates.</p> <p><b>Unit 4: Cellular Communication and Cell Cycle</b> <b>List</b> the stages of the cell cycle and describe the sequence of events and activities of these stages. <b>List</b> the phases of mitosis proper, describe the events characteristic of each phase and be able to recognize a diagram or micrograph of each stage. <b>Identify</b> factors which stimulate or inhibit cell division. <b>Explain</b> how cancerous cell division is different from normal cell activity. <b>Distinguish</b> between sexual and asexual reproduction. Compare the chromosomal contents of haploid and diploid cells. <b>Indicate</b> where mitosis and meiosis would occur in a given organism. <b>List</b> the phases of meiosis, describe the events that characterize each phase and be able to recognize these phases in diagrams.</p> <p><b>Fall Semester Final Exam Review and Exams</b></p>	<p><b>Big Idea 2:</b> 2C1, 2C2, 2D1, 2D2, 2D3, 2D4, 2E1, 2E2, 2E3</p> <p><b>Big Idea 4:</b> 4A5, 4A6, 4B1, 4B2, 4B3, 4B4, 4C3, 4C4</p> <p><b>Big Idea 1:</b> Essential Knowledge (EK): 1A1, 1A2, 1A3, 1A4, 1B1, 1B2, 1C1, 1C2, 1C3</p>	<p><b>Unit 7: Natural Selection (cont'd)</b> <b>Distinguish</b> between phylogeny and systematics. <b>Distinguish</b> between systematics and taxonomy. <b>Define</b> the parts and describe the interrelationships within a cladogram. <b>Explain</b> how a cladogram is constructed. <b>Compare</b> DNA and RNA viruses; identify the structural components and compare the reproductive cycles of viruses. <b>Describe</b> the general characteristics of bacteria. <b>Explain</b> the significance of bacteria in the earth's ecosystem. <b>Population Genetics:</b> Write the general Hardy-Weinberg theorem, use it to calculate allele and genotype frequencies. <b>Explain</b> how genetic drift, gene flow, mutation, nonrandom mating and natural selection can cause microevolution. <b>Give</b> the cause of genetic variation in a population. <b>Explain</b> the concept of relative fitness and its role in adaptive evolution. <b>Describe</b> what selection acts on and what factors contribute to the overall fitness of a genotype. <b>Distinguish</b> between anagenesis and cladogenesis. <b>Distinguish</b> between prezygotic and postzygotic isolating mechanisms.</p> <p><b>Unit 8: Ecology</b> <b>Distinguish</b> between the six increasingly comprehensive levels of ecological study. <b>Distinguish</b> between the exponential model and the logistical model of population growth (include a graph that illustrates both models). <b>Compare and contrast</b> K-selection and r-selection with reference to selection for life history traits. <b>Explain</b> how age structure, generation time, and sex structure of populations can effect population growth. <b>Describe</b> the recorded human population growth and discuss the estimates for human carrying capacity. <b>Discuss</b> the modes of interspecific interactions between species and how they affect population density. <b>Distinguish</b> between a food chain and a food web. Include a list of the 5 trophic levels. <b>Compare</b> a "dominant species" to a "keystone species" and give an example how each can impact a community. <b>Compare and contrast</b> primary succession and secondary succession. <b>Explain</b> the two components that contribute to the biodiversity of a community. <b>List</b> the 4 biogeochemical cycles and describe the importance of each within an ecosystem. <b>Explain</b> 3 impacts humans have on ecosystems and describe what is meant by biological magnification with reference to toxins.</p> <p><b>Advanced Placement Exam Preparation and Exam</b></p> <p><b>Spring Semester Final Exam Review and Exams</b></p>