

DEPARTMENT: SCIENCE	COURSE TITLE. ADVANCED PLACEMENT BIOLOGY COURSE NUMBER: 228
GRADE(S): 11/12	PRE-REQUISITES (IF ANY): HONORS CHEMISTRY RECOMMENDED

UNIT	LENGTH	CONTENT	SKILLS	METHODS OF ASSESSMENT	FRAMEWORK STRAND(S) & STANDARD(S)
UNIT 1: Ecology	4 days	<ul style="list-style-type: none"> Population dynamics, biotic potential, limiting factors Interactions between species Ecosystems, energy flow, productivity Biological communities, succession, biomes Biogeochemical cycles, future of the biosphere 	Students will: <ul style="list-style-type: none"> Complete independent summer reading. Extract information from written sources. Construct and interpret graphs. Demonstrate understanding of mathematical modeling. Make essay outlines. Practice lab safety. 	<ul style="list-style-type: none"> AP Bio Lab #12: Dissolved Oxygen and Aquatic Primary productivity Writing assessment Essay Outlines Summer work notebook assessment Unit exam 	Ecology: 6.1, 6.2, 6.3, 6.4, 6.5
UNIT 2: Chemistry of Life	14 days	<ul style="list-style-type: none"> Introduction to biology Scientific investigation Darwin's contributions to evolutionary theory Biological chemistry, atoms, Molecules, bonding, pH, water Carbon chemistry, functional groups Carbohydrates, lipids, proteins, nucleic acids Dehydration synthesis, hydrolysis, free-energy changes, equilibrium Enzymes, coenzymes, cofactors, activity rates, regulation Overview of life on Earth Virus structure and function Origin of life theories 	Students will: <ul style="list-style-type: none"> Apply scientific method to problem solving. Construct models. Recognize science as an ongoing process with continual revision based on interpretation of observations and experimental data. Relate structure to function. Extract information from written sources. Construct and interpret graphs. Make essay outlines. Practice lab safety. 	<ul style="list-style-type: none"> Chemistry of Carbohydrates Lab Chemistry of Fats Lab Chemistry of Proteins Lab Biologically Important Molecules Lab Lab Practical: Analysis unknown Protein Structure - Gel Electrophoresis Activity Take-home Quiz Essay outlines Unit Notebook Assessment Unit Exam 	The Chemistry of Life: 1.1, 1.2, 1.3, 1.4, 1.5 Genetics:3.8 Evolution and Biodiversity: 4.1, 4.2
UNIT 3: Cell Structure and Function	16 days	<ul style="list-style-type: none"> Prokaryotic and eukaryotic cells Plant, animal and fungal cells Structure and function of organelles, subcellular components of motility, cytoskeleton Diffusion and osmosis Osmotic balance and water potential Cell membrane structure and function Passive and active transport mechanisms 	Students will: <ul style="list-style-type: none"> Use and care for microscopes correctly. Estimate size of microscopic specimens. Demonstrate understanding of slide preparation techniques. Perform unit conversion. 	<ul style="list-style-type: none"> The Microscope: Basic Skills Lab The Cell Structure and Function Lab Cell Size Lab AP Lab #1: Diffusion and Osmosis 	Structure and Function of Cells: 2.1, 2.2, 2.3, 2.4, 2.5

		<ul style="list-style-type: none"> • Cell communication 	<ul style="list-style-type: none"> • Make detailed observations. • Make detailed lab drawings. • Develop models and recognize their limitations. • Relate structure to function. • Extract information from written sources. • Interpret diagrams. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • Plasmolysis Lab • Take-home Quiz • Essay outlines • Unit Notebook Assessment • Unit Exam • Lab Practical: Microscope Skill Assessment • Self Assessment 	
UNIT 4: Cellular Energetics	14 days	<ul style="list-style-type: none"> • Oxidation-reduction, thermodynamics and free energy • ATP and energy transfer • Coupled reactions and chemiosmosis • Glycolysis, fermentation, and aerobic respiration • Photosynthesis, photosystems I and II, Calvin cycle and carbon fixation • C3 and C4 photosynthesis • Evolution of metabolism 	<p>Students will:</p> <ul style="list-style-type: none"> • Model and analyze complex chemical processes. • Understand component relationships in complex systems. • Construct an evolutionary time line. • Interpret charts and diagrams. • Relate structure to function. • Design experiments. • Extract information from written sources. • Interpret diagrams. • Construct and interpret graphs. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • AP Lab #2: Enzyme Catalysis • Lab: Designing a Controlled Experiment • Cell Respiration and Photosynthesis Manipulative Models Activities Assessment • Evolution of Metabolism chart • Essay outlines • Unit Notebook Assessment • Unit Exam 	Structure and Function of Cells: 2.6, 2.7, 2.8, 2.9
UNIT 5: Cell Reproduction and Molecular Genetics	16 days	<ul style="list-style-type: none"> • Prokaryotic and eukaryotic cell reproduction • Cell cycle, mitosis, cytokinesis • DNA: structure and replication, experimental evidence • Eukaryotic chromosomal structure, nucleosome, transposable elements • RNA: transcription, mRNA editing, translation • DNA and RNA viruses • Regulation of gene expression 	<p>Students will:</p> <ul style="list-style-type: none"> • Use the microscope correctly. • Model and analyze complex molecular processes. • Understand component relationships in complex systems. • Relate structure to function. • Extract information from written sources. • Interpret diagrams. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • AP Bio Lab #3: Mitosis and Meiosis • Lab Practical: Mitosis Stages Identification • Lab Practical: DNA Structure and Replication • Lab Practical: RNA Transcription and Protein Synthesis • Essay outlines • Unit Notebook Assessment • Unit Exam 	Structure and Function of Cells: 2.10 Genetics: 3.1, 3.2, 3.3, 3.8

<p>UNIT 6: Meiosis, Genetics, and Gene Technology</p>	<p>17 days</p>	<ul style="list-style-type: none"> • Meiosis, sexual reproduction, gene recombination • Mendel's Laws, probability, genetic crosses • Inheritance patterns: chromosomes, genes, alleles, interactions • Mutations • Recombinant DNA, DNA cloning, hybridization, DNA sequencing • Genetic engineering applications 	<p>Students will:</p> <ul style="list-style-type: none"> • Use Punnett squares and probability to solve genetics problems. • Construct and analyze pedigrees. • Perform statistical analysis of data using Chi Square. • Use the microscope. • Model and analyze complex molecular processes. • Understand component relationships in complex systems. • Relate structure to function. • Extract information from written sources. • Interpret diagrams. • Construct a genetic map. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • AP Bio Lab #3: Mitosis and Meiosis • Crossing Over in Sordaria Lab • Genetics: The Principles of Mendel Lab • Human Genetics Traits Lab • AP Bio Lab #7: Genetics of Drosophila • DNA Fingerprinting Activity • Take-home essay • Essay outlines • Unit Notebook Assessment • Unit Exam • Self Assessment 	<p>Structure and Function of Cells: 2.10 Genetics: 3.3, 3.4, 3.5, 3.6, 3.7</p>
<p>UNIT 7: Evolution and Classification</p>	<p>14 days</p>	<ul style="list-style-type: none"> • Evidence for evolution • Natural selection • Population genetics: Hardy-Weinberg principle, factors influencing allelic frequencies • Speciation: isolating mechanisms, allopatry, sympatry, adaptive radiation • Patterns of evolution, gradualism, punctuated equilibrium • Animal diversity: classification, phylogeny, survey of acoelomate, pseudocoelomate, protosome and deuterostome phyla 	<p>Students will:</p> <ul style="list-style-type: none"> • Understand classification. • Use dichotomous keys to identify organisms. • Construct dichotomous keys. • Construct a phylum chart. • Perform data analysis. • Draw inferences from data. • Construct an evolutionary cladogram. • Extract information from written sources. • Interpret diagrams. • Construct and interpret graphs. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • AP Bio Lab #8: Population Genetics and Evolution • Genetic Drift Lab • Survey of Kingdoms Protista and Fungi Lab • Lab Practical: Animal Phyla Identification • Shark Key • Buncus Key • Amino Acid Sequencing Activity • Molecular Clock Activity • Unit Notebook Assessment • Unit Exam • Midterm Exam 	<p>Evolution and Biodiversity: 4.1, 4.2, 4.3</p>

<p>UNIT 8A: Animal Anatomy and Physiology</p>	<p>10 days</p>	<ul style="list-style-type: none"> • Organization of the vertebrate body • Structure and function of tissues, organs and systems used for locomotion and digestion • Animal adaptations for locomotion and digestion 	<p>Students will:</p> <ul style="list-style-type: none"> • Use the microscope correctly. • Model and analyze complex molecular processes. • Understand component relationships in complex systems. • Relate structure to function. • Extract information from written sources. • Interpret diagrams. • Construct and interpret graphs. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • Vertebrate Animal Tissues Lab • The Human Skeletal Lab • Muscles and Muscle Contraction Lab • Phylum Chart Comparisons • Essay outlines • Unit Notebook Assessment • Unit Exam 	<p>Human Anatomy and Physiology: 5.1, 5.2</p>
<p>UNIT 8B: Animal Anatomy and Physiology</p>	<p>15 days</p>	<ul style="list-style-type: none"> • Structure and function of tissues, organs and systems used for circulation, respiration and excretion • Animal adaptations for circulation, respiration and excretion • Homeostasis 	<ul style="list-style-type: none"> • Model and analyze complex molecular processes. • Understand component relationships in complex systems. • Relate structure to function. • Extract information from written sources. • Interpret diagrams. • Construct and interpret graphs. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • Human Breathing Rate Lab • AP Bio Lab #10: Physiology of the Circulatory System • Blood Pressure Lab • Interpreting a Circulation Graph • Phylum Chart Comparisons • Essay outlines • Unit Notebook Assessment • Unit Exam 	<p>Human Anatomy and Physiology: 5.1, 5.2</p>
<p>UNIT 9: Homeostasis</p>	<p>12 days</p>	<ul style="list-style-type: none"> • Structure and function of tissues and organs of the nervous, sensory, endocrine and immune systems • Animal adaptations in the nervous, sensory, endocrine and immune systems • Maintaining homeostasis 	<p>Students will:</p> <ul style="list-style-type: none"> • Use the microscope. • Model and analyze complex molecular processes. • Understand component relationships in complex systems. • Relate structure to function. • Extract information from written sources. • Interpret diagrams. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • Reflex and Senses Lab • Brain Function Activity • Leukocyte Identification Lab • Phylum Chart Comparisons • Essay outlines • Take-home essay • Unit Notebook Assessment • Unit Exam 	<p>Human Anatomy and Physiology: 5.1, 5.2</p>

<p>UNIT 10: Reproduction, Development and Behavior</p>	<p>9 days</p>	<ul style="list-style-type: none"> • Structure and function of tissues, organs needed for reproduction • Animal adaptations for reproduction • Gametogenesis, fertilization, embryology, development • Cellular mechanisms of development • Animal behavior 	<p>Students will:</p> <ul style="list-style-type: none"> • Use the microscope correctly. • Model and analyze complex molecular processes. • Understand component relationships in complex systems. • Relate structure to function. • Extract information from written sources. • Interpret diagrams. • Construct and interpret graphs. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • Gametogenesis Lab • Comparative Embryology Lab • AP Bio Lab #11: Behavior: Habitat Selection • Phylum Chart Comparisons • Essay outlines • Unit Notebook Assessment • Unit Exam • Self assessment 	<p>Structure and Function of Cells: 2.10 Genetics: 3.7 Human Anatomy and Physiology: 5.1, 5.2</p>
<p>UNIT 11: Plant Structure and Function</p>	<p>19 days</p>	<ul style="list-style-type: none"> • Plant diversity: classification, divisions, adaptations to land, alternation of generations in moss, fern, pine, and the flowering plants • Structure and physiology of vascular plants • Seed formation, germination, growth in seed plants • Hormonal regulation of plant growth • Plant response to stimuli: tropisms, photo-periodicity 	<p>Students will:</p> <ul style="list-style-type: none"> • Demonstrate understanding of classification. • Use the microscope correctly. • Model and analyze complex molecular processes. • Understand component relationships in complex systems. • Relate structure to function. • Extract information from written sources. • Interpret diagrams. • Construct and interpret graphs. • Make essay outlines. • Practice lab safety. 	<ul style="list-style-type: none"> • Survey of Plant Kingdom Lab • Plant Anatomy Lab • AP Bio Lab #9: Transpiration • AP Bio Lab #4: Plant Pigments and Photosynthesis • Flower, Fruit and Seed Lab • Essay outlines • Unit Notebook Assessment • Unit Exam • Final Exam 	<p>Structure and Function of Cells: 2.1, 2.3, 2.6, 2.7, 2.9, 2.10 Evolution and Biodiversity: 4.3 Ecology: 6.5</p>
<p>UNIT 12: Invertebrate and Vertebrate Dissections and Independent Research Project</p>	<p>16 days</p>	<ul style="list-style-type: none"> • Invertebrate and vertebrate dissections • Student directed independent research projects and presentations 	<p>Students will:</p> <ul style="list-style-type: none"> • Use the microscope correctly. • Make detailed observations. • Make detailed lab drawings. • Interpret diagrams. • Understand component relationships in complex systems. • Relate structure to function. • Extract information from written/internet sources. • Collect, interpret and assess information from multiple sources. • Prepare and present a 20-minute oral research report. • Practice lab safety. 	<ul style="list-style-type: none"> • Earthworm Dissection Lab • Fish Dissection Lab • Frog Dissection Lab • Research project Presentation 	