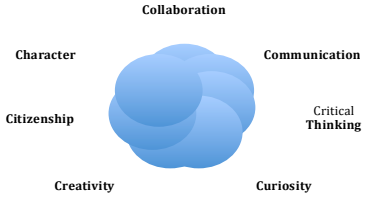
Content Area: Science	Course: AP Biology	Grade Level: 11-12
	**R14 The Seven Cs of Learning** 	

Unit Titles	Length of Unit
• Nature of Science; Molecules of Life	• 2 week
• Cell structure and Function	• 4 weeks
• Gene Structure and Expression	• 4 weeks
• Human Systems	• 5 weeks
• Evolution	• 6 weeks
• Ecology	• 4 weeks
• Plants	• 4 weeks
• Plant and Animal Diversity	• 4 weeks

Strands	Course Level Expectations
Big Idea 1	• Students will understand that the process of evolution drives the diversity and unity of life.
Big Idea 2	• Students will understand that biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis.
Big Idea 3	• Students will know that living systems store, retrieve, transmit, and respond to information essential to life processes.
Big Idea 4	• Students will understand biological systems interact, and these systems and their interactions possess complex properties.

* Course expectations based the course outlines from the College Board. For more information visit: https://apcentral.collegeboard.org/pdf/ap-biology-course-and-exam-description.pdf?course=ap-biology

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Unit Title	**Nature of Science; Molecules of Life**	**Length of Unit**	2 weeks

Inquiry Questions (Engaging & Debatable)	● How do the bonding structures between atoms and molecules influence how materials appear and behave at the macroscopic level? ● How do the properties of water make life possible? ● Why is carbon considered the "Backbone of Life"?
Standards*	● **Big Ideas:** 1 & 4 ● **Learning objectives:** 1.27, 1.28, 1.29, 1.30, 1.31, 4.1, 4.2, 4.3
Unit Strands & Concepts	● Biological systems ● Complex properties
Key Vocabulary	macromolecules, polymer, proteins, lipids, carbohydrates, nucleic acids

*Standards based on CollegeBoard AP Biology Course and Exam Description
For more information visit: https://apcentral.collegeboard.org/pdf/ap-biology-course-and-exam-description.pdf

Unit Title	Nature of Science; Molecules of Life	Length of Unit	2 weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
• The subcomponents of biological molecules and their sequence determine the properties of that molecule. • There are several hypotheses about the natural origin of life on Earth, each with supporting scientific evidence.	• Explain the connection between sequence and the subcomponents of a biological polymer and its properties • Refine representations and models to explain how the subcomponents of a biological polymer and their sequence determine the properties of that polymer. • use models to predict and justify that changes in the subcomponents of a biological polymer affect the functionality of the molecule. • Describe a scientific hypothesis about the origin of life on Earth. • Evaluate scientific questions based on hypotheses about the origin of life on Earth. • Describe the reasons for revisions of scientific hypotheses of the origin of life on Earth. • Evaluate scientific questions based on hypotheses about the origin of life on Earth. • Evaluate the accuracy and legitimacy of data to answer scientific questions about the origin of life on Earth.

Assessments:	• Lab: Basic laboratory techniques, Lab: Water Properties & Lab: Analysis of Macromolecules • Summative Assessment
Teacher Resources:	Region 14 Implementation Guide CollegeBoard - AP Central

Unit Title	Cell Structure and Function	**Length of Unit**	4 weeks

Inquiry Questions (Engaging & Debatable)	• How do cells maintain their internal and external environments? • How do prokaryotes and eukaryotes differ in their structures? • How are feedback mechanisms used to regulate growth, reproduction and homeostasis? • How do cells communicate with each other?
Standards	• **Big Ideas:** 2 & 4 • **Learning Objectives:** 2.1, 2.2, 2.4, , 2.41, 2.5 - 2.20, 3.31 - 3.39, 4.4-4.6, 4.17, 4.22
Unit Strands & Concepts	• Growth and Reproduction. • Homeostasis • Feedback Mechanisms • Communication Between Cells
Key Vocabulary	homeostasis, cell communication, signal transduction pathway, apoptosis, feedback mechanisms

Unit Title	Cell Structure and Function	**Length of Unit**	4 weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
• All living systems require constant input of free energy. • Organisms capture and store free energy for use in biological processes. • Organisms must exchange matter with the environment to grow, reproduce, and maintain organization. • Cell membranes are selectively permeable due to their structure. • Growth and dynamic homeostasis are maintained by the constant movement of molecules across membranes. • Eukaryotic cells maintain internal membranes that • partition the cell into specialized regions. • Organisms use feedback mechanisms to maintain their internal environments and respond to external environments. • Organisms respond to changes in their external environments.	• Explain how biological systems use free energy based on empirical data that all organisms require constant energy input to maintain organization, to grow, and to reproduce • Justify a scientific claim that free energy is required for living systems to maintain organization, to grow, or to reproduce, but that multiple strategies exist in different living systems. • Use representations to pose scientific questions about what mechanisms and structural features allow organisms to capture, store and use free energy. • Evaluate data to show the relationships between photosynthesis and respiration in the flow of energy through a system. • Construct explanations of the mechanisms and structural features of cells that allow organisms to capture, store or use free energy. • Use calculated surface area-to-volume ratios to predict which cell(s) might eliminate wastes or procure nutrients faster by diffusion. • Explain how cell size and shape affect the overall rate of nutrient intake and the rate of waste elimination. • Justify the selection of data regarding the types of molecules that an animal, plant, or bacterium will take up as necessary building blocks and excrete as waste products.

• Cell communication processes share common features that reflect a shared evolutionary history. • Cells communicate with each other through direct contact with other cells or from a distance via chemical signaling. • Signal transduction pathways link signal reception with cellular response. • Changes in signal transduction pathways can alter cellular response. • The structure and function of subcellular components, and their interactions, provide essential cellular processes • Organisms exhibit complex properties due to interactions between their constituent parts. • Variation in molecular units provides cells with a wider range of functions.	• Represent graphically or model quantitatively the exchange of molecules between an organism and its environment, and the subsequent use of these molecules to build new molecules that facilitate dynamic homeostasis, growth and reproduction. • Use representations and models to pose scientific questions about the properties of cell membranes and selective permeability based on molecular structure. • Construct models that connect movement of molecules across membranes with membrane structure and function. • Use representations and models to analyze situations or solve problems qualitatively and quantitatively to investigate whether dynamic homeostasis is maintained by the active movement of molecules across membranes. • Explain how internal membranes and organelles contribute to cell functions. • Use representations and models to describe differences in prokaryotic and eukaryotic cells. • Justify a claim made about the effect(s) on a biological system at the molecular, physiological or organismal level when given a scenario in which one or more components within a negative regulatory system is altered. • Connect how organisms use negative feedback to maintain their internal environments. • Evaluate data that show the effect(s) of changes in concentrations of key molecules on negative feedback mechanisms. • Make predictions about how organisms use negative feedback mechanisms to maintain their internal environments.

	• Make predictions about how positive feedback Mechanisms amplify activities and processes in organisms based on scientific theories and models. • Justify that positive feedback mechanisms amplify responses in organisms. • Describe basic chemical processes for cell communication shared across evolutionary lines of descent. • Generate scientific questions involving cell communication as it relates to the process of evolution. • Use representation(s) and appropriate models to describe features of a cell signaling pathway. • Construct explanations of cell communication through cell-to-cell direct contact or through chemical signaling. • Create representation(s) that depict how cell-to-cell communication occurs by direct contact or from a distance through chemical signaling. • Describe a model that expresses the key elements of signal transduction pathways by which a signal is converted to a cellular response. • Justify claims based on scientific evidence that changes in signal transduction pathways can alter cellular response. • Describe a model that expresses key elements to show how change in signal transduction can alter cellular response. • Construct an explanation of how certain drugs affect signal reception and, consequently, signal transduction pathways. • Make a prediction about the interactions of subcellular organelles. • Construct explanations based on scientific evidence as to how interactions of subcellular structures provide essential functions.

	• Use representations and models to analyze situations • qualitatively to describe how interactions of subcellular • structures, which possess specialized functions, provide • essential functions. • Analyze data to identify how molecular interactions affect structure and function. • Construct explanations based on evidence of how variation in molecular units provides cells with a wider range of functions.

Assessments:	● Lab: Surface Area To Volume, Lab: The Compound Microscope, Lab: Cell Types ● Lab: Diffusion Osmosis formal lab report, Lab: plasmolysis ● Formative Assessment: water potential problems ● Lab: Enzyme Activity, Lab: Cell respiration/fermentation ● Unit test
Teacher Resources:	Region 14 Implementation Guide CollegeBoard - AP Central

Unit Title	Gene Structure and Expression	Length of Unit	4 weeks

Inquiry Questions **(Engaging & Debatable)**	• How does DNA and/or RNA transfer information from one generation to the next? • How do environmental factors affect genotypes and phenotypes? • How are gene regulated and expressed? • What are the ethical, social and medical issues surrounding genetics?
Standards	• **Big Idea:** 3 • **Learning Objectives**: 3.1-3.30, 4.7, 4.23, 4.24
Unit Strands & Concepts	• Heredity • Cellular and molecular mechanisms. • Genetic variation. • Diversity Within Biological Systems.
Key Vocabulary	gene, operons, protein synthesis, genotype, phenotype, alleles, mitosis, meiosis

Unit Title	Gene Structure and Expression	Length of Unit	4 weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
● DNA, and in some cases RNA, is the primary source of heritable information. ● In eukaryotes, heritable information is passed to the next generation via processes that include the cell cycle and mitosis or meiosis plus fertilization. ● The chromosomal basis of inheritance provides an understanding of the pattern of passage (transmission) of genes from parent to offspring. ● The inheritance pattern of many traits cannot be explained by simple Mendelian genetics. ● Gene regulation results in differential gene expression, leading to cell specialization. ● A variety of intercellular and intracellular signal transmissions mediate gene expression. ● Changes in genotype can result in changes in phenotype. ● Biological systems have multiple processes that increase genetic variation.	● Construct scientific explanations that use the structures and mechanisms of DNA and RNA to support the claim that DNA and, in some cases, that RNA are the primary sources of heritable information. ● Justify the selection of data from historical investigations that support the claim that DNA is the source of heritable information. ● Describe representations and models that illustrate how genetic information is copied for transmission between generations. ● Describe representations and models illustrating how genetic information is translated into polypeptides. ● Explain how heritable information can be manipulated using common technologies. ● Predict how a change in a specific DNA or RNA sequence can result in changes in gene expression. ● Make predictions about natural phenomena occurring during the cell cycle. ● Describe events that occur in the cell cycle. ● Construct an explanation, using visual representations or

● Viral replication results in genetic variation, and viral infection can introduce genetic variation into the hosts. ● Interactions between external stimuli and regulated gene expression result in specialization of cells, tissues and organs. ● Environmental factors influence the expression of the genotype in an organism.	narratives, as to how DNA in chromosomes is transmitted to the next generation bia mitosis, or meiosis followed by fertilization. ● Represent the connection between meiosis and increased genetic diversity necessary for evolution. ● Evaluate evidence provided by data sets to support the claim that heritable information is passed from one generation to another generation through mitosis, or meiosis followed by fertilization. ● Construct a representation that connects the process of meiosis to the passage of traits from parent to offspring. ● Post questions about ethical, social, or medical issues surrounding human genetic disorders. ● Apply mathematical routines to determine Mendelian patterns of inheritance provided by a data sets. ● Explain deviations from Mendel's model of the inheritance of traits. ● Explain how the inheritance patterns of many traits cannot be accounted for by Mendelian genetics. ● Describe representations of an appropriate example of inheritance patterns that cannot be explained by Mendel's model of the inheritance of traits. ● Describe the connection between the regulation of gene expression and observed differences between different kinds of organisms. Describe the connection between the regulation of gene expression and observed differences between individuals in a population.

	● Explain how the regulation of gene expression is essential for the processes and structures that support efficient cell function. ● Use representations to describe how gene regulation influences cell products and function. ● Explain how signal pathways mediate gene expression, including how this process can affect protein production. ● Use representations to describe mechanisms of the regulation of gene expression. ● Predict how a change in genotype, when expressed as a phenotype, provides a variation that can be subject to natural selection. ● Create a visual representation to illustrate how changes in a DNA nucleotide sequence can result in a change in the polypeptide produced. ● Explain the connection between genetic variation in organisms and phenotypic variations in populations. ● Compare and contrast processes by which genetic variation is produced and maintained in organisms from multiple domains. ● Construct an explanation of the multiple processes that increase variation within a population. ● Construct an explanation of how viruses introduce genetic variation in host organisms. ● Use representations and appropriate models to describe how viral replication introduces genetic variation in the viral population.

	● Refine representations to illustrate how interactions between external stimuli and gene expression result in specialization of cells, tissues and organs. ● Construct explanations of the influence of environmental factors on the phenotype of an organisms. ● Predict the effects of a change in an environmental factor on the gene expression and the resulting phenotype of an organism.

Assessments:	● Lab: pGlO transformation ● Lab: cell cycle ● Quiz: Chi square analysis ● Lab: Protein synthesis ● Lab: gel electrophoresis ● Activity: operons ● Summative Assessment
Teacher Resources:	Region 14 Implementation Guide CollegeBoard - AP Central

Unit Title	Human Systems	Length of Unit	5 weeks

Inquiry Questions (Engaging & Debatable)	• How do the nonspecific and specific immune responses help organisms protect itself? • How does the nervous system detect external/internal stimuli, integrate the information and produce a response from it? • How does an organism regulate its internal environment based on the external environment to maintain homeostasis? • How do the body organ systems function to maintain homeostasis in organisms?
Standards	• **Big Ideas:** 2 & 3 • **Learning Objectives:** 2.27, 2.29 - 2.34, 2.36, 2.42, 2.43, 3.43-3.50, 4.18
Unit Strands & Concepts	• Homeostasis • Growth, Reproduction and Dynamic Homeostasis • Transmission of information in Biological Systems
Key Vocabulary	dynamic homeostasis, negative and positive feedback mechanisms

Unit Title	Human Systems	Length of Unit	weeks

Critical Content: My students will **Know**…	Key Skills: My students will be able to **(Do)**…
• Plants and animals have a variety of chemical defenses against infections that affect dynamic homeostasis. • Timing and coordination of specific events are necessary for the normal development of an organism, and these events are regulated by a variety of mechanisms. • Timing and coordination of physiological events are regulated by multiple mechanisms. • Timing and coordination of behavior are regulated by various mechanisms and are important in natural selection. • Individuals can act on information and communicate it to others. • Animals have nervous systems that detect external and internal signals, transit, and integrate information, and produce responses.	• Connect differences in the environment with the evolution of homeostatic mechanisms. • Pose a scientific question concerning the behavioral or physiological response of an organism to change in its environment. • Connect the concept of cell communication to the functioning of the immune system. • Can create representations and models to describe immune responses. • Create representations or models to describe nonspecific immune defenses in plants and animals. • Connect concepts in and across domains to show that timing and coordination of specific events are necessary for normal development in an organism and that these events are regulated by multiple mechanisms. • Use a graph or diagram to analyze situations or solve problems (quantitatively and qualitatively) that involve timing and coordination of events necessary for normal development in an organism. • Justify scientific claims with scientific evidence to show that timing and coordination of several events are necessary for normal development in an organism and that these events are regulated by multiple mechanisms. • Describe the role of programmed cell death in development and differentiation, the reuse of molecules, and the maintenance of dynamic homeostasis. • Justify scientific claims with evidence to show how timing and coordination of physiological events involve regulation. • Construct an explanation, based on scientific theories and models, about ow nervous systems detect external and internal signals, transmit and integrate information, and

	produce responses. • Describe how nervous systems transmit information. • Describe how the vertebrate brain integrates information to produce a response. • Create a visual representation of complex nervous systems to describe/explain how these systems detect external and internal signals, transmit and integrate information, and produce responses. • Create a visual representation to describe how nervous systems detect external and internal signals. • Create a visual representation to describe how nervous systems transmit information. • Create a visual representation to describe how the vertebrate brain integrates information to produce a response. • Evaluate scientific questions concerning organisms that exhibit complex properties due to the interaction of their constituent parts. • Predict the effects of a change in a component(s) of a biological system on the functionality of an organism(s). • Refine representations and models to illustrate biocomplexity due to interactions of the constituent parts. • Use representations and models to analyze how cooperative interactions within organisms promote efficiency in the use of energy and matter. • Construct explanations based on scientific evidence that homeostatic mechanisms reflect continuity due to common ancestry and/or divergence due to adaptation in different environments.

Assessments:	• Lab: Tissue Histology, Lab: Expiratory vital capacity, Lab: Circulatory, Lab: Fetal Pig Dissection, Lab practical: Fetal pig • Summative Assessment
Teacher Resources:	Region 14 Implementation Guide CollegeBoard - AP Central

Unit Title	Evolution	Length of Unit	6 weeks

Inquiry Questions (Engaging & Debatable)	• How does natural selection lead to evolution? • What evidence do scientists have for evolution? • How quickly does evolution occur? • How is phylogeny used to show evolution?
Standards	• **Big Idea**: 1 • **Learning Objectives**: 1.1 - 1.26, 1.32
Unit Strands & Concepts	• Evolution • Common Ancestry. • Life continues to evolve within a changing environment. • Growth and Dynamic Homeostasis of a Biological System
Key Vocabulary	descent with modification, homology, phylogeny, cladogram, Hardy-Weinberg equilibrium

Unit Title	Evolution	Length of Unit	weeks

Critical Content: My students will Know…	Key Skills: My students will be able to (Do)…
● Natural selection is a major mechanism of evolution. ● Natural selection acts on phenotypic variations in populations. ● Evolutionary change is also driven by random processes. ● Biological evolution is supported by scientific evidence from many disciplines, including mathematics. ● Organisms share many conserved core processes and features that evolved and are widely distributed among organisms today. ● Phylogenetic trees and cladograms are graphical representations (models) of evolutionary history to be tested. ● Speciation and extinction have occurred throughout the Earth's history. ● Speciation may occur when two populations become reproductively isolated from each other. ● Populations of organisms continue to evolve.	● Convert a data set from a table of numbers that reflect a change in the genetic makeup of a population over time and to apply mathematical methods and conceptual understandings to investigate the cause(s) and effect(s) of this change. ● Evaluate evidence provided by data to qualitatively and/or quantitatively investigate the role of natural selection in evolution. ● Apply mathematical methods to data from a real or simulated population to predict what will happen to the population in the future. ● Evaluate data-based evidence that describes evolutionary changes in the genetic makeup of a population over time. ● Connect evolutionary changes in a population over time to a change in the environment. ● Use data from mathematical models based on the Hardy-Weinberg equilibrium to analyze genetic drift and effects of selection in the evolution of specific populations. ● Justify the selection of data from mathematical models on the Hardy-Weinberg equilibrium to analyze genetic drift and the effects of selection in the evolution of specific populations. ● Make predictions about the effects of genetic drift, migration, and artificial selection on the genetic makeup of a population. ● Evaluate evidence provided data from many scientific disciplines that support biological evolution. ● Refine evidence based on data from many scientific disciplines that support

● Homeostatic mechanisms reflect both common ancestry and divergence due to adaptation in different environments. ● Cell communication processes share common features that reflect a shared evolutionary history.	biological evolution. ● Design a plan to answer scientific questions regarding how organisms have changed over time using information from morphology, biochemistry, and geology. ● Connect scientific evidence from many scientific disciplines to support the modern concept of evolution. ● Construct and/or justify mathematical models, diagrams, or simulations that represent processes of biological evolution. ● Pose scientific questions that correctly identify essential properties of shared, core life processes that provide insights into the history of life on Earth. ● Describe specific examples of conserved core biological processes and features shared by all domains or within one domain of lie, and how theses shared, conserved core processes and features support the concept of common ancestry for all organisms. ● Justify the scientific claim that organisms share many conserved core processes and features that evolved and are widely distributed among organisms today. ● Post scientific questions about a group of organisms whose relatedness is described by a phylogenetic tree or cladogram in order to (1) identify shared characteristics, (2) make inferences about the evolutionary history of the group, and (3) identify character data that could extend or improve the phylogenetic tree. ● Evaluate evidence provided by a data set in conjunction with a phylogenetic tree or a simple cladogram to determine evolutionary history and speciation. ● Create a phylogenetic tree or simple cladogram that correctly represents evolutionary history and speciation from a provided data set. ● Analyze data related to questions of speciation and extinction throughout Earth's history. ● Design a plan for collecting data to investigate the scientific claim that speciation and extinction have occurred throughout Earth's history. ● Use data from a real or simulated population(s), based on graphs or models of

	types of selection, to predict what will happen to the population in the future. ● Justify the selection of data that address questions related to reproductive isolation and speciation. ● Describe speciation in an isolated population and connect it to change in gene frequency, change in environment, natural selection and/or genetic drift. ● Describe a model that represents evolution within a population. ● Evaluate given data sets that illustrate evolution as an ongoing process. ● Justify selection of geological, physical, and chemical data that reveal early Earth conditions. ● Analyze data to identify phylogenetic patterns or relationships, showing that homeostatic mechanisms reflect both continuity due to common ancestry and change due to evolution in different environments.

Assessments:	● Lab: Natural Selection, Lab: Evolution and classification, Lab: Population Genetics (Hardy-Weinberg) ● Formative Assessment: Hardy-Weinberg, Activity: Cladograms, ● Lab: BLAST ● Unit Test
Teacher Resources:	Region 14 Implementation Guide CollegeBoard - AP Central

Unit Title	**Ecology**	**Length of Unit**	4 weeks

Inquiry Questions (Engaging & Debatable)	• How is energy recycled in the environment? • How do abiotic and biotic factors affect living organisms? • How do species interact with each other? • How do humans impact the environment?
Standards	• **Big Ideas:** 2 & 4 • **Learning Objectives**: 2.3, 2.21-2.24, 2.28, 2.38-2.40, 2.42, 3.40-3.42, 4.11-4.16, 4.19-4.21, 4.25-4.27
Unit Strands & Concepts	• Growth and Dynamic Homeostasis of a Biological System • Interactions within Biological Systems • Competition and cooperation are important aspects of biological systems. • Diversity Within Biological Systems
Key Vocabulary	symbiosis, trophic level, keystone species, niche, eutrophication

Unit Title	Ecology	Length of Unit	4 weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
● All biological systems from cells and organisms to populations, communities and ecosystems are affected by complex biotic and abiotic interactions involving exchange of matter and free energy. ● Biological systems are affected by disruptions to their dynamic homeostasis. ● Individuals can act on information and communicate it to others. ● Communities are composed of populations of organisms that interact in complex ways. ● Interactions among living systems and with their environment result in the movement of matter and energy. ● Cooperative interactions within organisms promote efficiency in the use of energy and matter.	● Predict how changes in free energy availability affect organisms, populations and/or ecosystems. ● Justify the selection of the kind of data needed to answer scientific questions about the relevant mechanism that organisms use to respond to changes in their external environment. ● Refine scientific models and questions about the effect of complex biotic and abiotic interactions on all biological systems, from cells and organisms to populations, communities and ecosystems. ● Design a plan for collecting data to show that all biological systems (cells, organisms, populations, communities and ecosystems) are affected by complex biotic and abiotic interactions. ● Analyze data to identify possible patterns and relationships between a biotic and abiotic factor and a biological system (cells, organisms, populations, communities or ecosystems). ● Use representations or models to analyze quantitatively and qualitatively the effects of disruptions to dynamic homeostasis in biological systems. ● Analyze data to support the claim that responses to information and communication of information affect natural selection. ● Justify scientific claims, using evidence, to describe how timing and coordination of behavioral events in organisms are regulated by several mechanisms.

● Interactions between and within populations influence patterns of species distribution and abundance. ● Distribution of local and global ecosystems changes over time. ● The level of variation in a population affects populatio dynamics. ● The diversity of species within an ecosystem may influence the stability of the ecosystem.	● Connect concepts in and across domain(s) to predict how environmental factors affect response to information and change behavior. ● Able to analyze data that indicate how organisms exchange information in response to internal changes and external cues, and which can change behavior. ● Create a representation that describes how organisms exchange information in response to internal changes and external cues, and which can result in changes in behavior. ● Describe how organisms exchange information in response to internal changes or environmental cues. ● Justify the selection of the kind of data needed to answer scientific questions about the interaction of populations within communities. ● Apply mathematical routines to quantities that describe communities composed of populations of organisms that interact in complex ways. ● Predict the effects of a change in the community's populations on the community. ● Apply mathematical routines to quantities that describe interactions among living systems and their environment, which result in the movement of matter and energy. ● Use visual representations to analyze situations or solve problems qualitatively to illustrate how interactions among living systems and with their environment result in the movement of matter and energy. ● Predict the effects of change of matter or energy availability on communities. ● Use data analysis to refine observations and measurements regarding the effect of population interactions on patterns of species distribution and abundance.

	● Explain how the distribution of ecosystems changes over time by identifying large-scale events that have resulted in these changes in the past. ● Predict consequences of human actions on both local and global ecosystems. ● Justify a claim that a variety of phenotypic responses to a single environmental factor can result from different genotypes within the population. ● Use theories and models to make scientific claims and/or predictions about the effects of variation within populations on survival and fitness. ● Make scientific claims and predictions about how species diversity within an ecosystem influences ecosystem stability.

Assessments:	• Lab: Demography • Lab: Food webs • Lab: Animal Behavior • Lab: Dissolved oxygen • Unit Test
Teacher Resources:	Region 14 Implementation Guide CollegeBoard - AP Central

Unit Title	Plants	Length of Unit	4 weeks

Inquiry Questions (Engaging & Debatable)	• How do plants grow in height and girth? • How do plants get nutrition and transport it from the different environments in which they live? • How do plants reproduce?
Standards	• **Big Ideas**: 2 • **Learning Objectives:** 2.36, 2.37,2.4, 2.41, 2.5, 2.30, 3.42, 4.8-4.10
Unit Strands & Concepts	• Growth, Reproduction and Maintenance • Growth, Reproduction and Dynamic Homeostasis • Growth and Dynamic Homeostasis of a Biological System • Biological Processes
Key Vocabulary	double fertilization, meristems, primary and secondary growth, mycorrhizae

Unit Title	Plants	Length of Unit	weeks

Critical Content: My students will Know…	Key Skills: My students will be able to (Do)…
● All living systems require constant input of free energy. ● Organisms capture and store free energy for use in biological processes. ● Organisms must exchange matter with the environment to grow, reproduce and maintain organization. ● Organisms use feedback mechanisms to maintain their internal environments and respond to external environmental changes. ● Organisms respond to changes in their external environments. ● Plants and animals have a variety of chemical defenses against infections that affect dynamic homeostasis. ● Timing and coordination of specific events are necessary for the normal development of an organism, and these events are regulated by a variety of mechanisms.	● Design a plan for collecting data to support the scientific claim that the timing and coordination of physiological events involve regulation. ● Connect concepts that describe mechanisms that regulate the timing and coordination of physiological events ● Evaluate data to show the relationship between photosynthesis and cell respiration in the flow of energy through a system. ● Use representations to pose scientific questions about what mechanisms and structural features allow organisms to capture, store and use free energy. ● Construct explanations of the mechanisms and structural features of cells that allow organisms to capture, store and use free energy. ● Justify the selection of data regarding the types of molecules that an animal, plant, or bacterium will take up as necessary building blocks and excrete as waste products. ● Connect concepts that describe mechanisms that regulate the timing and coordination of physiological events. ● Describe how organisms exchange information in response to internal changes or environmental cues. ● Explain how plants acquire resources/nutrition and transport them.

Assessments:	● Lab: Plant cell and tissue types, Lab: Plant structure, Lab: Transpiration, Lab: Plant pigments chromatography ● Lab: Photosynthesis, Lab: Plant reproduction structures, Unit test
Teacher Resources:	Region 14 Implementation Guide CollegeBoard - AP Central

Unit Title	Plant and Animal Diversity	Length of Unit	4 weeks

Inquiry Questions (Engaging & Debatable)	● How have plants and animals diversified over time? ● What factors have led to the diversification of plants and animals? ● How have adaptations allowed plants and animals to live on land?
Standards	HS-LS4-1
Unit Strands & Concepts	**DISCIPLINARY CORE IDEAS (DCI):** ● Evidence of Common Ancestry and Diversity **Cross Cutting Concepts (CCC)** ● Patterns
Key Vocabulary	deuterostome, protostome, gastrulation

*Standards for this unit are based on the Next Generation Science Standards (NGSS) and the National Research Council (NRC) as well the requirements for the UCONN ECE.
For more information visit: http://portal.ct.gov/SDE/Science/Science-Standards-and-Resources

Unit Title	Plant and Animal Diversity	Length of Unit	4 weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
● Natural selection allows plants and animals to diversify in different environments due to their structures and functions. ● Events that have happened on Earth have influenced the diversification of plants and animals. ● Plants and animals needed adaptations to survive on land.	● Explain the processes that occur in embryonic development. ● Evaluate different plants and animals to determine the characteristics that allow them survive in their native environments. ● Classify plants and animals based on their structural and molecular characteristics.

Assessments:	• Lab: Nonvascular plants, Lab: Seed plants, Lab: Fungi • Lab: Invertebrates, Lab: Vertebrates • Unit test
Teacher Resources:	Region 14 Implementation Guide CollegeBoard - AP Central