

Expectations and Outcomes

Grade Level/Course: 11-12

Content Area: Science

Unit Title	Guarantees
<p>Unit 1 BIG IDEA 1: The process of evolution drives the diversity and unity of life.</p>	<ul style="list-style-type: none"> • Enduring Understanding 1.A. Change in the genetic makeup of a population over time is evolution. <ul style="list-style-type: none"> ○ Natural selection is a major mechanism of evolution. ○ Natural selection acts on phenotypic variations in populations. ○ Evolutionary change is also driven by genetic drift and artificial selection. ○ Biological evolution is supported by evidence from many scientific disciplines. • Enduring Understanding 1.B. Organisms are linked by lines of descent from common ancestry. <ul style="list-style-type: none"> ○ Organisms share many conserved core processes and features that evolved and are widely distributed among organisms today. ○ A phylogenetic tree and/or a cladogram is a graphical representation (model) of evolutionary history that can be tested. ○ Non-eukaryotes can transfer genetic information laterally through the mechanisms of transformation, transduction and conjugation; most eukaryotes do not transfer information laterally. • Enduring Understanding 1.C. Life continues to evolve within a changing environment. <ul style="list-style-type: none"> ○ 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. • Enduring Understanding 1.D. The origin of living systems is explained by natural processes. <ul style="list-style-type: none"> ○ There is causal models about the origin of life on Earth. <p>1. D.2 Evidence from many different scientific disciplines supports models of the origin of life.</p>
<p>Unit 2 BIG IDEA 2: Biological systems utilize energy and molecular building blocks</p>	<ul style="list-style-type: none"> • Enduring Understanding 2.A. Growth, reproduction, and maintaining organization of living systems require energy and matter. <ul style="list-style-type: none"> ○ . All living systems require constant input of energy.

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<p>to grow, to reproduce, and to maintain homeostasis.</p>	<ul style="list-style-type: none"> ○ Organisms capture, use, and store energy in biological processes such as growth, reproduction and maintaining homeostatic processes. ○ . Organisms must exchange matter with the environment to grow, reproduce, and maintain organization. ○ Programmed cell death (apoptosis) plays a role in development and differentiation, allows molecules to be reused, and helps maintain homeostasis within a biological system. ● Enduring Understanding 2.B. Growth, reproduction, and homeostasis require that cells create and maintain internal environments that are different from their external environments. <ul style="list-style-type: none"> ○ Cell membranes are selectively permeable due to their structure. ○ Growth and homeostasis is maintained by the constant movement of molecules across membranes. ○ Eukaryotic cells maintain internal membranes that partition the cell into specialized regions. ● Enduring Understanding 2.C. Organisms use feedback mechanisms to regulate growth and maintain homeostasis. <ul style="list-style-type: none"> ○ Positive feedback mechanisms amplify responses and processes in biological organisms. ○ Organisms use negative feedback mechanisms to maintain their internal environments and respond to external environmental changes. ○ Organisms constantly respond to changes in their external environments. ● Enduring Understanding 2.D. Growth and homeostasis of a biological system are influenced by changes in the system’s environment. <ul style="list-style-type: none"> ○ All biological systems from cells to populations, communities, and ecosystems are affected by complex biotic and abiotic interactions. ○ Homeostatic mechanisms reflect both continuity due to common ancestry and divergence due to adaptation in different environments. ○ Biological systems are affected by disruptions to their homeostasis. ○ Plants and animals have a variety of chemical defenses against infections that affect homeostasis. ● Enduring Understanding 2.E. Many biological processes involved in growth, reproduction, and homeostasis include temporal aspects.

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	<ul style="list-style-type: none"> ○ Timing and coordination of several events are necessary for the normal development of an organism, and these events require regulation by multiple mechanisms. ○ 2Timing and coordination of physiological events are regulated by multiple mechanisms <p>2. E.3. Timing and coordination of behavior is regulated by several mechanisms.</p>
<p>Unit 3 BIG IDEA 3: Living systems store, retrieve, transmit, and respond to information essential to life processes.</p>	<ul style="list-style-type: none"> ● Enduring Understanding 3.A. Heritable information provides for continuity of life. <ul style="list-style-type: none"> ○ DNA, and in some cases RNA, is the primary source of heritable information. ○ In most eukaryotes, heritable information is passed to the next generation through mitosis or meiosis plus fertilization. ○ Mendelian genetics provides a basic understanding of the underlying causes of the pattern traits from parent to offspring. ○ The inheritance pattern of many traits cannot be explained by simple Mendelian genetics. ● Enduring Understanding 3.B. Expression of genetic information involves cellular and molecular mechanisms. <ul style="list-style-type: none"> ○ Cells can be activated, produce new products, and retain their activated state through gene regulation ○ A variety of intercellular and intracellular signal transmissions mediates gene expression. ● Enduring Understanding 3.C. Transfer of genetic information may produce variation. <ul style="list-style-type: none"> ○ Changes in genotype can result in changes in phenotype. ○ Biological systems possess multiple mechanisms that increase genetic variation. ○ Viruses reproduce and can introduce genetic variation into their hosts. ● Enduring Understanding 3.D Cells communicate by generating, transmitting, and receiving chemical signals. <ul style="list-style-type: none"> ○ Cell communication involves processes resulting from evolution that is shared common features. ○ . Cells communicate with each other through direct contact with other cells or from a distance <i>via</i> chemical signaling. ○ Signal transduction pathways link signal reception with cellular response. ○ Errors in normal signal transduction may alter cellular response. ● Enduring Understanding 3.E. Transmission of non-heritable information results in changes within and between biological systems.

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	<ul style="list-style-type: none"> ○ Organisms exchange information with each other in response to internal changes and external cues, which may change behavior. ○ Multi-cellular animals have nervous systems that detect external and internal signals, transmit and integrate information, and produce responses. <p>3. E.3. Individuals can act on information and communicate it to others.</p>
<p>Unit 4 BIG IDEA 4: Biological systems interact, and these interactions possess complex properties.</p>	<ul style="list-style-type: none"> ● Enduring Understanding 4.A. Interactions within biological systems lead to complex properties. <ul style="list-style-type: none"> ○ The subcomponents of a biological polymer and their sequence determine the properties of that polymer. ○ Interactions of subcellular structures, including a repertory of eukaryotic organelles possessing specialized functions, provide essential cellular functions and activities. ○ Interactions between external stimuli and gene expression result in specialization of cells, tissues, and organs. ○ Organisms exhibit complex properties due to interactions between their constituent parts. ○ 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. ● Enduring Understanding 4.B. Competition and cooperation are important aspects of biological systems. <ul style="list-style-type: none"> ○ Interactions between molecules affect their structure and function. ○ Interactions between cells affect the fitness of the organism. ○ Cooperative interactions within organisms increase efficiency in the use of energy and matter. ○ Interactions between and within populations influence patterns of species distribution and abundance ○ 4Global distribution of ecosystems changes substantially over time. ● Enduring Understanding 4.C. Variation within biological systems affects interactions with the environment. <ul style="list-style-type: none"> ○ Variation in molecular units provides cells with a wider range of functions.

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	<ul style="list-style-type: none">○ Environmental factors influence the expression of the genotype in an organism.○ The level of variation in a population affects population dynamics.○ Diversity of species within an ecosystem may influence the stability of the ecosystem