Spanish Fork High School

Target Standards for AP Biology

Big Idea #1

The process of evolution drives the diversity and unity of life

1A: Change in the genetic makeup of a population over time is evolution

- I CAN explain how Natural Selection is a major mechanism of evolution
- I CAN explain how Natural selection acts on phenotypic variations in populations.
- I CAN show that Evolutionary change is also driven by random processes.
- I CAN give examples to support that Biological Evolution is supported by scientific evidences
- I CAN provide evidences that Variation within a population is a necessary condition for natural selection to occur.
- I CAN demonstrate that The Hardy-Weinberg equilibrium provides a mathematical way to study the allele frequency changes within a population.
- I CAN provide Evidences for evolution helps us to determine evolutionary relationships.
- I CAN show that Structural similarities of body parts give rise to the understanding of evolutionary relationships.

1B: Organisms are linked by lines of descent from common ancestry

- I CAN give support that Organisms share many conserved core processes and features that evolved and are widely distributed among organisms today.
- I CAN diagram Phylogenetic trees and cladograms to show that they are graphical representations of evolutionary history that can be tested, and show evolutionary relationships between organisms.
- I CAN explain Classification Schemes to show common ancestry lines.
- I CAN give evidences to show that Similarities in Animal features help link ancestry lines.

1C: Life continues to evolve within a changing environment

- I can explain how speciation has occurred throughout the Earth's history.
- I can explain how speciation may occur when two populations become reproductively isolated from each other.
- I can provide evidence that extinction has occurred throughout the Earth's history

1D: There are several hypotheses about the natural origin of life on Earth, each with supporting scientific evidences.

- I CAN explain the several hypotheses about the natural origin of life on Earth, each with supporting scientific evidences.
- I CAN provide evidences that there are several hypotheses about the natural origin of life on Earth, each with supporting scientific evidences.

Big Idea #2

Biological systems utilize energy and molecular building blocks to grow, to reproduce, and to maintain homeostasis

2A: Growth reproduction and maintenance of the organization of living systems require free energy and matter

- I CAN explain how all living systems require constant input of free energy.
- I CAN explain how the properties of water impact living systems.
- I CAN show how organisms obtain nutrients and eliminate waste products efficiently by maintaining high surface area to volume ratios at the cellular level.
- I CAN explain how specific cellular structures are used to maximize the exchange of materials with the environment.
- I CAN explain how organisms use various reproductive strategies to maximize free energy.
- I can provide evidence how organisms use different mechanisms to capture and store free energy.

2B: Growth, reproduction and dynamic homeostasis require that cells create and maintain internal environments that are different from their external environments.

- I CAN describe how the plasma (cell) membrane is composed of many different molecules which make it selectively permeable due to its structure.
- I CAN explain how plasma membranes are selectively permeable and concentration gradients drive transport.
- I CAN describe how cell walls have a structural and functional purpose in the cell.
- I CAN show how eukaryotic cells have internal membranes that partition the cell, Prokaryotic cells do not.

2C: Organisms use feedback mechanisms to regulate growth and reproduction, and to maintain dynamic homeostasis

- I CAN describe how organisms use specific feedback mechanisms to respond to environmental changes.

- I CAN explain how organisms use cellular mechanisms to respond to environmental changes through behavioral and physiological mechanisms.

2D: Growth and dynamic homeostasis of a biological system are influenced by changes in the system's environment.

- I CAN describe how community structure is affected by biotic and abiotic factors. Help create ecosystems and biomes.
- I CAN diagram how Energy flows through trophic levels in the ecosystem.
- I CAN explain how Ecosystems are always undergoing slow continuous change to structure and energy needs.
- I CAN explain how organisms have complex relationships and interactions in communities. These interactions are maintained by feeding and energy transfer .patterns. Competition and Symbiosis
- I CAN provide examples how organisms have a variety of mechanisms to exchange nutrients and wastes with the environment.
- I CAN explain how the mammalian immune response contains nonspecific and specific mechanisms to maintain a dynamic homeostasis.
- I CAN explain the development of an organism, and success of a population, is dependent upon the regulation, timing and coordination of several cellular events.

2E: Many biological processes involved in growth, reproduction and dynamic homeostasis include temporal regulation and coordination.

- I CAN explain how timing of coordination of specific events is necessary for the normal development of an organism, and these events are regulated y a variety of mechanisms.
- I CAN explain how timing and coordination of physiological events are regulated by multiple mechanisms.
- I CAN show how timing and coordination of behavior are regulated by various mechanisms and are important in natural selection.

Big Idea #3:

Living systems store, retrieve, transmit, and respond to information essential to life processes.

3A: Heritable information provides for continuity of life.

- I CAN describe how DNA, and in some cases RNA, is the primary source of heritable information.
- I CAN explain how in eukaryotes, heritable information is passed to the next generation via processes that include the cell cycle and mitosis and meiosis plus fertilization.
- I CAN show how the chromosomal basis of inheritance provides an understanding of the pattern of passage of genes from parent to offspring.

- I CAN describe the inheritance pattern of many traits cannot be explained by simple Mendelian Genetics.

3B: Expression of genetic information involves cellular and molecular mechanisms.

- I CAN explain how gene regulation results in differential gene expression, leading to cell specialization.
- I CAN show how a variety of intercellular signal transmissions mediate gene expression.

3C: The processing of genetic information is imperfect and is a source of genetic variation.

- I CAN describe how changes in genotypes can result in changes in phenotypes.
- I CAN explain how biological systems have multiple processes that increase genetic variation.
- I CAN describe how viral replication results in genetic variation and viral infection can introduce genetic variation into hosts.

3D: Cells communicate by generating, transmitting, and receiving chemical signals.

- I CAN describe how cell communication processes share common features that reflect a shared evolutionary history.
- I CAN explain how cells communicate with each other through direct contact with other cells or from a distance via chemical signaling.
- I CAN show how signal transduction pathways link signal reception with cellular response.
- I CAN describe how changes in signal transduction pathways can alter cellular response.

3E: Transmission of information results in changes within and between biological systems.

- I CAN describe how individuals can act on information and communicate it to others.
- I CAN explain how animals have nervous systems that detect external and internal signals, transmit and integrate information, and produce responses.

Big Idea #4:

Biological systems interact, and these interactions possess complex properties.

4A: Interactions within biological systems lead to complex properties.

- I CAN explain the subcomponents of biological molecules and their sequence determine the properties of that molecule.
- I CAN describe the structure and function of sub cellular components, and their interactions, provide essential cellular responses.

- I CAN show how interactions between external stimuli and regulated gene expression result in specialization of cells, tissues, and organs.
- I CAN describe how organisms exhibit complex properties due to interactions between their constituent parts.
- I CAN show how communities are composed of populations of organisms that interact in complex ways.

4B: Competition and cooperation are important aspects of biological systems.

- I CAN describe how interactions between molecules affect their structure and function.
- I CAN show how cooperative interactions within organisms promote efficiency in the use of energy and matter.
- I CAN describe how the distribution of local and global ecosystems changes over time.

4C: Naturally occurring diversity among and between components within biological systems affects interactions with the environment.

- I CAN explain how variation in molecular units provides cells with a wider range of functions.
- I CAN describe how environmental factors influence the expression of the genotype in an organism.
- I CAN show how the level of variation in a population affects population dynamics.
- I CAN explain how the diversity of species within an ecosystem may influence the stability.