**AP Biology Course Standards**

**Domain 1: Evolution**

1.1: Natural selection is a major mechanism of evolution.

Performance indicators:

1.2: Natural selection acts on phenotypic variations in populations.

Performance indicators:

1.3: Evolutionary change is also driven by random processes.

Performance indicators:

1.4: Biological evolution is supported by scientific evidence from many disciplines, including mathematics.

Performance indicators:

1.5: Organisms share many conserved core processes and features that evolved and are widely distributed among organisms today.

Performance indicators:

1.6: Phylogenetic trees and cladograms are graphical representations (models) of evolutionary history that can be tested.

Performance indicators:

1.7: Speciation and extinction have occurred throughout the Earth’s history.

Performance indicators:

1.8: Speciation may occur when two populations become reproductively isolated from each other.

Performance indicators:

1.9: Populations of organisms continue to evolve.

Performance indicators:

1.10: There are several hypotheses about the natural origin of life on Earth, each with supporting scientific evidence.

Performance indicators:

1.11: Scientific evidence from many different disciplines supports models of the origin of life.

**Domain 2: Matter**

2.1: Organisms must exchange matter with the environment to grow, reproduce and maintain organization.

Performance indicators:

2.2: The subcomponents of biological molecules and their sequence determine the properties of that molecule.

Performance indicators:

2.3: Variation in molecular units provides cells with a wider range of functions.

Performance indicators:

2.4: Cell membranes are selectively permeable due to their structure.

Performance indicators:

2.5: Growth and dynamic homeostasis are maintained by the constant movement of molecules across membranes.

Performance indicators:

2.6: Eukaryotic cells maintain internal membranes that partition the cell into specialized regions.

Performance indicators:

2.7: The structure and function of subcellular components, and their interactions, provide essential cellular processes.

**Domain 3: Energy**

3.1: All living systems require constant input of free energy.

Performance indicators:

3.2: Interactions between molecules affect their structure and function.

Performance indicators:

3.3: Organisms capture and store free energy for use in biological processes.

Performance indicators:

3.4: Cooperative interactions within organisms promote efficiency in the use of energy and matter.

**Domain 4: Information**

4.1: DNA, and in some cases RNA, is the primary source of heritable information.

Performance indicators:

4.2: Changes in genotype can result in changes in phenotype.

Performance indicators:

4.3: Viral replication results in genetic variation, and viral infection can introduce genetic variation into the hosts.

Performance indicators:

4.4: In eukaryotes, heritable information is passed to the next generation via processes that include the cell cycle and mitosis or meiosis plus fertilization.

Performance indicators:

4.5: The chromosomal basis of inheritance provides an understanding of the pattern of passage (transmission) of genes from parent to offspring.

Performance indicators:

4.6: The inheritance pattern of many traits cannot be explained by simple Mendelian genetics.

Performance indicators:

4.7: Biological systems have multiple processes that increase genetic variation.

Performance indicators:

4.8: Gene regulation results in differential gene expression, leading to cell specialization.

Performance indicators:

4.9: A variety of intercellular and intracellular signal transmissions mediate gene expression.

Performance indicators:

4.10: Environmental factors influence the expression of the genotype in an organism.

**Domain 5: Regulation**

5.1: 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.

Performance indicators:

5.2: Interactions between external stimuli and regulated gene expression result in specialization of cells, tissues and organs.

Performance indicators:

5.3: Organisms use feedback mechanisms to maintain their internal environments and respond to external environmental changes.

Performance indicators:

5.4: Homeostatic mechanisms reflect both common ancestry and divergence due to adaptation in different environments.

Performance indicators:

5.5: Biological systems are affected by disruptions to their dynamic homeostasis.

Performance indicators:

5.6: Plants and animals have a variety of chemical defenses against infections that affect dynamic homeostasis.

Performance indicators:

5.7: Timing and coordination of behavior are regulated by various mechanisms and are important in natural selection.

**Domain 6: Communication**

6.1: Cell communication processes share common features that reflect a shared evolutionary history.

Performance indicators:

6.2: Cells communicate with each other through direct contact with other cells or from a distance via chemical signaling.

Performance indicators:

6.3: Signal transduction pathways link signal reception with cellular response.

Performance indicators:

6.4: Changes in signal transduction pathways can alter cellular response.

Performance indicators:

6.5: Individuals can act on information and communicate it to others.

Performance indicators:

6.6: Animals have nervous systems that detect external and internal signals, transmit and integrate information, and produce responses.

**Domain 7: Interactions**

7.1: Organisms exhibit complex properties due to interactions between their constituent parts.

Performance indicators:

7.2: Organisms respond to changes in their external environments.

Performance indicators:

7.3: Interactions among living systems and with their environment result in the movement of matter and energy.

Performance indicators:

7.4: 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.

Performance indicators:

7.5: The level of variation in a population affects population dynamics.

Performance indicators:

7.6: Interactions between and within populations influence patterns of species distribution and abundance.

Performance indicators:

7.7: Communities are composed of populations of organisms that interact in complex ways.

Performance indicators:

7.8: The diversity of species within an ecosystem may influence the stability of the ecosystem.

Performance indicators:

7.9: Distribution of local and global ecosystems changes over time.

**Science Practices:**

Domain 1: use representations and models to communicate scientific phenomena and solve scientific problems.

Domain SP 2: use mathematics appropriately.

Domain SP 3: engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.

Domain SP 4: plan and implement data collection strategies appropriate to a particular scientific question.

Domain SP 5: perform data analysis and evaluation of evidence.

Domain SP 6: work with scientific explanations and theories.

Domain SP 7: connect and relate knowledge across various scales, concepts and representations in/across domains.