Life Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	**LC-HS-LS1-1a** Relate DNA molecules to the way cells store and use information to guide their functions.
	LC-HS-LS1-1b Relate groups of specialized cells (e.g., heart cells, nerve cells, muscle cells, epithelial cells, fat cells, blood cells) within organisms to the performance of essential functions of life.
	LC-HS-LS1-1c Identify evidence supporting an explanation of how a substance called DNA carries genetic information in all organisms which codes for the proteins that are essential to an organism.
HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	**LC-HS-LS1-2a** Using model(s), identify that different systems of the body carry out essential functions (e.g., digestive system, respiratory system, circulatory system, nervous system).
	LC-HS-LS1-2b Using model(s), identify the hierarchical organization of systems that perform specific functions within multicellular organisms.
HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis in living organisms.	**LC-HS-LS1-3a** Identify how different organisms react (e.g., heart rate, body temperature) to changes in their external environment.
	LC-HS-LS1-3b Identify examples of how organisms use feedback mechanisms to maintain dynamic homeostasis.
HS-LS1-4 Use a model to illustrate the role of the cell cycle and differentiation in producing and maintaining complex organisms.	**LC-HS-LS1-4a** Identify how growth and/or maintenance (repair/replacement) occurs when cells multiply (i.e., mitosis) using a model.
HS-LS1-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	**LC-HS-LS1-5a** Identify model of photosynthesis, which shows the conversion of light energy to stored chemical energy.
HS-LS1-6 Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	**LC-HS-LS1-6a** Using a model(s), identify how organisms take in matter and rearrange the atoms in chemical reactions to form different products allowing for growth and maintenance.

Life Science FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	**LC-HS-LS1-7a** Using a model(s), identify respiration as the transfer of stored energy to the cell to sustain life's processes (i.e., energy to muscles or energy for maintaining body temperature).
HS-LS1-8 Obtain, evaluate, and communicate information about (1) viral and bacterial reproduction and adaptation, (2) the body's primary defenses against infection, and (3) how these features impact the design of effective treatment.	**LC-LS1-8a** Identify the process by which a virus uses a host cell's functions to make new viruses.
	LC-LS1-8b Recognize that most bacteria reproduce asexually resulting in two cells exactly like the parent cell.
	LC-LS1-8c Identify ways to protect against infectious diseases to maintain a body's health (e.g., eat nutritious food, washing hands, rest, exercise, etc.).
	LC-LS1-8d Identify treatments and/or prevention of viral and/or bacterial infections (e.g., antibiotics and vaccines).

Life Science ECOSYSTEMS: INTERACTIONS, ENERGY AND DYNAMICS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity, biodiversity and populations of ecosystems at different scales.	**LC-HS-LS2-1a** Recognize that the carrying capacities of ecosystems are related to the availability of living and nonliving resources and challenges (e.g., predation, competition, disease).
	LC-HS-LS2-1b Use a graphical representation to identify carrying capacities in ecosystems as limits to the numbers of organisms or populations they can support.
HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	**LC-HS-LS2-4a** Use a graphical or mathematical representation to identify the changes in the amount of matter as it travels through a food web.
	LC-HS-LS2-4b Use a graphical or mathematical representation to identify the changes in the amount of energy as it travels through a food web.
HS-LS2-6 Evaluate the claims, evidence and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	**LC-HS-LS2-6a** Use evidence to identify how modest biological or physical changes versus extreme changes affect stability and change (e.g., number and types of organisms) in ecosystems.
	LC-HS-LS2-6b Evaluate explanations of how living things in an ecosystem are affected by changes in the environment (e.g., changes to the food supply, climate change, or the introduction of predators).
	LC-HS-LS2-6c Evaluate explanations of how interactions in ecosystems maintain relatively stable conditions, but changing conditions may result in a new ecosystem.
HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	**LC-HS-LS2-7a** Describe how people can help protect the Earth's environment and biodiversity (e.g., preserving ecosystems) and how a human activity would threaten Earth's environment and biodiversity (e.g., pollution, damaging habitats, over hunting).
	LC-HS-LS2-7b Evaluate or refine a solution to changes in an ecosystem (biodiversity) resulting from a human activity.

Life Science HEREDITY: INHERITANCE AND VARIATION OF TRAITS	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS3-1 Formulate, refine, and evaluate questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	**LC-HS-LS3-1a** Identify that DNA molecules in all cells contain the instructions for traits passed from parents to offspring.
	LC-HS-LS3-1b Identify appropriate questions about the relationships between DNA and chromosomes and how traits are passed from parents to offspring.
HS-LS3-2 Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	**LC-HS-LS3-2a** Identify a model showing evidence that parents and offspring may have different traits.
	LC-HS-LS3-2b Identify that meiosis is a process which distributes genetic material among the new cells (i.e., gametes) produced, which results in genetic variation.
	LC-HS-LS3-2c Identify that when DNA makes a copy of itself, sometimes errors occur that may lead to genetic variations.
	LC-HS-LS3-2d Identify examples of mutations in DNA caused by environmental factors.
	LC-HS-LS3-2e Use evidence to support a claim about a source of inheritable genetic variations.
HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	**LC-HS-LS3-3a** Calculate the probability (e.g., two out of four) of a particular trait in an offspring based on a completed Punnett square.
	LC-HS-LS3-3b Identify examples, using data, of environmental factors which affect the expression of traits, and so then affect the probability of occurrences of traits in a population.

Life Science BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY	
Louisiana Student Standards	**Louisiana Connectors (LC)**
HS-LS4-1 Analyze and interpret scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	**LC-HS-LS4-1a** Identify patterns (e.g., DNA sequences, fossil records) as evidence to a claim of common ancestry.
HS-LS4-2 Construct an explanation based on evidence that biological diversity is influenced by (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	**LC-HS-LS4-2a** Recognize that as a species grows in number, competition for limited resources also increases.
	LC-HS-LS4-2b Recognize that different individuals have specific traits that give advantages (e.g., survive and reproduce at higher rates) over other individuals in the species.
	LC-HS-LS4-2c Identify how evolution may be a result of genetic variation through mutations and sexual reproduction in a species that is passed on to their offspring.
HS-LS4-3 Apply concepts of statistics and probability to support explanations that populations of organisms adapt when an advantageous heritable trait increases in proportion to organisms lacking this trait.	**LC-HS-LS4-3a** Use patterns in data to identify how heritable variations in a trait may lead to an increasing proportion of individuals within a population with that trait (i.e., an advantageous characteristic).
HS-LS4-4 Construct an explanation based on evidence for how natural selection and other mechanisms lead to genetic changes in populations.	**LC-HS-LS4-4a** Use data to provide evidence for how specific biotic or abiotic differences in ecosystems (e.g., ranges of seasonal temperature, acidity, light, geographic barriers) support the claim that organisms with an advantageous heritable trait are better able to survive over time.
HS-LS4-5 Evaluate evidence supporting claims that changes in environmental conditions can affect the distribution of traits in a population causing: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	**LC-HS-LS4-5a** Identify the relationship between naturally occurring or human-induced changes in the environment (e.g., drought, flood, deforestation, fishing, application of fertilizers) and the expression of traits in a species (e.g., peppered moth studies).
	LC-HS-LS4-5b Identify the relationship between naturally occurring or human-induced changes in the environment (e.g., drought, flood, deforestation, fishing, application of fertilizers) and the emergence of new species over time.
	LC-HS-LS4-5c Identify that species become extinct because they can no longer survive and reproduce given changes in the environment.