Onslow County Schools K-12 Science Continuum

	Structures and Functions of Living Organisms	Ecosystems	Evolution and Genetics	Molecular Biology
Kindergarten	**K.L.1 Compare characteristics of animals that make them alike and different from other animals and nonliving things.** K.L.1.1 Compare different types of the same animal (i.e. different types of dogs, different types of cats, etc.) to determine individual differences within a particular type of animal. K.L.1.2 Compare characteristics of living and nonliving things in terms of their: structure, growth, changes, movement, basic needs.			
Grade 1		**1.L.1 Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive.** 1.L.1.1 Recognize that plants and animals need air, water, light (plants only), space, food and shelter and that these may be found in their environment. 1.L.1.2 Give examples of how the needs of different plants and animals can be met by their environments in North Carolina or different places throughout the world. 1.L.1.3 Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there. (e.g., reuse or recycle products to avoid littering).		**1.L.2 Summarize the needs of living organisms for energy and growth.** 1.L.2.1 Summarize the basic needs of a variety of different plants (including air, water, nutrients, and light) for energy and growth. 1.L.2.2 Summarize the basic needs of a variety of different animals (including air, water, and food) for energy and growth. (same concept, but different organism)
Grade 2	**2.L.1 Understand animal life cycles.** 2.L.1.1 Summarize the life cycle of animals: birth, developing into an adult, reproducing, aging and death. 2.L.1.2 Compare life cycles of different animals such as, but not limited to, mealworms, ladybugs, crickets, guppies or frogs.		**2.L.2 Remember that organisms differ from or are similar to their parents based on the characteristics of the organism.** 2.L.2.1 Identify ways in which many plants and animals closely resemble their parents in observed appearance and ways they are different. 2.L.2.2 Recognize that there is variation among individuals that are related.	
Grade 3	**3.L.1 Understand human body systems and how they are essential for life: protection, movement and support.** 3.L.1.1 Compare the different functions of the skeletal and muscular system. 3.L.1.2 Explain why skin is necessary for protection and for the body to remain healthy.	**3.L.2 Understand how plants survive in their environments.** 3.L.2.1 Remember the function of the following structures as it relates to the survival of plants in their environment: (Roots – absorb nutrients; Stems – provide support; Leaves – synthesize food; Flowers – attract pollinators and produce seeds for reproduction 3.L.2.2 Explain how environmental conditions determine how well plants survive and grow. 3.L.2.3 Summarize the distinct stages of the life cycle of seed plants. 3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine the ability of soil to support the growth and survival of many plants.		
Grade 4		**4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.** 4.L.1.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful. 4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment. 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). 4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.		**4.L.2 Understand food and the benefits of vitamins, minerals and exercise.** 4.L.2.1 Classify substances as food or non-food items based on their ability to provide energy and materials for survival, growth and repair of the body. 4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body.

Grade 5	**5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.** 5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive. 5.L.1.2 Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, cardiovascular) in terms of their functions necessary for life.	**5.L.2 Understand the interdependence of plants and animals with their ecosystem.** 5.L.2.1 Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands. 5.L.2.2 Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors). 5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.	**5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism.** 5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism. 5.L.3.2 Give examples of likenesses that are inherited and some that are not.	

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Grade 6	**6.L.1 Understand the structures, processes and behaviors of plants that enable them to survive and reproduce.** 6.L.1.1 Summarize the basic structures and functions of flowering plants required for survival, reproduction and defense. 6.L.1.2 Explain the significance of the processes of photosynthesis, respiration and transpiration to the survival of green plants and other organisms.	**6.L.2 Understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment.** 6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers. 6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment. 6.L.2.3 Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis.		
Grade 7	**7.L.1 Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.** 7.L.1.1 Compare the structures and life functions of single-celled organisms that carry out all of the basic functions of life including: euglena, amoeba, paramecium, volvox. 7.L.1.2 Compare the structures and functions of plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles). 7.L.1.3 Summarize the hierarchical organization of multi-cellular organisms from cells to tissues to organs to systems to organisms. 7.L.1.4 Summarize the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, and excretion) and ways that these systems interact with each other to sustain life.		**7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.** 7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis). 7.L.2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis. 7.L.2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival.	
Grade 8	**8.L.1 Understand the hazards caused by agents of diseases that affect living organisms.** 8.L.1.1 Summarize the basic characteristics of viruses, bacteria, fungi and parasites relating to the spread, treatment and prevention of disease. 8.L.1.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and prevention of disease. **8.L.2 Understand how biotechnology is used to affect living organisms.** 8.L.2.1 Summarize aspects of biotechnology including: specific genetic information available, careers, economic benefits to North Carolina, ethical issues, implications for agriculture.	**8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment.** 8.L.3.1 Explain how factors such as food, water, shelter, and space affect populations in an ecosystem. 8.L.3.2 Summarize the relationships among producers, consumers, and decomposers including the positive and negative consequences of such interactions including: coexistence and cooperation, competition (predator/prey), parasitism, mutualism. 8.L.3.3 Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen).	**8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time.** 8.L.4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution. 8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment.	**8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms.** 8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants). 8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion).

	Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. Bio.1.1.1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mitochondria, vacuoles, chloroplasts, and ribosomes) and ways that these organelles interact with each other to perform the function of the cell. Bio.1.1.2 Compare prokaryotic and eukaryotic cells in terms of their general structures (plasma membrane and genetic material) and degree of complexity. Bio.1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms. **Bio.1.2 Analyze the cell as a living system.**	**Bio. 2.1 Analyze the interdependence of living organisms within their environments.** Bio.2.1.1 Analyze the flow of energy and cycling of matter (water, carbon, nitrogen and oxygen) through ecosystems relating the significance of each to maintaining the health and sustainability of an ecosystem. Bio.2.1.2 Analyze the survival and reproductive success of organisms in terms of behavioral, structural, and reproductive adaptations. Bio.2.1.3 Explain various ways organisms interact with each other (including predation, competition, parasitism, mutualism) and with their environments resulting in stability within ecosystems. Bio.2.1.4 Explain why ecosystems can be relatively stable over hundreds or thousands of years, even though populations may fluctuate (emphasizing availability of food, availability of shelter, number of predators and disease).	**Bio.3.1 Explain how traits are determined by the structure and function of DNA.** Bio.3.1.1 Explain the double-stranded, complementary nature of DNA as related to its function in the cell. Bio.3.1.2 Explain how DNA and RNA code for proteins and determine traits. Bio.3.1.3 Explain how mutations in DNA that result from interactions with the environment (i.e. radiation and chemicals) or new combinations in existing genes lead to changes in function and phenotype. **Bio.3.2 Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.**	**Bio.4.1 Understand how biological molecules are essential to the survival of living organisms.** Bio.4.1.1 Compare the structures and functions of the major biological molecules (carbohydrates, proteins, lipids, and nucleic acids) as related to the survival of living organisms. Bio.4.1.2 Summarize the relationship among DNA, proteins, and amino acids in carrying out the work of cells and how this is similar among all organisms. Bio.4.1.3 Explain how enzymes act as catalysts for biological reactions. **Bio.4.2 Analyze the relationships between biochemical processes and energy use in the cell.**

Life Science

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Biology	Bio.1.2.1 Explain how homeostasis is maintained in a cell and within an organism in various environments (including temperature and pH). Bio.1.2.2 Analyze how cells grow and reproduce in terms of interphase, mitosis and cytokinesis. Bio.1.2.3 Explain how specific adaptations help cells survive in particular environments (focus on unicellular organisms).	**Bio.2.2 Understand the impact of human activities on the environment (one generation affects the next).** Bio.2.2.1 Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of nonnative species) may impact the environment. Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next.	Bio.3.2.1 Explain the role of meiosis in sexual reproduction and genetic variation. Bio.3.2.2 Predict offspring ratios based on a variety of inheritance patterns (including dominance, co-dominance, incomplete dominance, multiple alleles, and sex-linked traits). Bio.3.2.3 Explain how the environment can influence the expression of genetic traits. **Bio.3.3 Understand the application of DNA technology.** Bio.3.3.1 Interpret how DNA is used for comparison and identification of organisms. Bio.3.3.2 Summarize how transgenic organisms are engineered to benefit society. Bio.3.3.3 Evaluate some of the ethical issues surrounding the use of DNA technology (including cloning, genetically modified organisms, stem cell research, and Human Genome Project). **Bio.3.4 Explain the theory of evolution by natural selection as a mechanism for how species change over time.** Bio.3.4.1 Explain how fossil, biochemical, and anatomical evidence support the theory of evolution. Bio.3.4.2 Explain how natural selection influences the changes in species over time. Bio.3.4.3 Explain how various disease agents (bacteria, viruses, chemicals) can influence natural selection. **Bio.3.5 Analyze how classification systems are developed based upon speciation.** Bio.3.5.1 Explain the historical development and changing nature of classification systems. Bio.3.5.2 Analyze the classification of organisms according to their evolutionary relationships (including dichotomous keys and phylogenetic trees).	Bio.4.2.1 Analyze photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport).