



High School Teaching and Learning

2022-2023 Scope and Sequence

Biology

Structure and Function of Living Things				OVERVIEW
				High school Biology includes concepts introduced in grades K-8 at a more abstract level. An in-depth study of the following concepts is included: the cell, the molecular basis of heredity, biological evolution, the interdependence of organisms, matter, energy and organization in living systems, and the adaptive responses of organisms. During this unit, students will analyze the cell as a living system and understand the relationship between the structures and functions of cells and their organelles.
ASSESSMENTS				
ASSESSMENT WINDOW				ASSESSMENT NAME
Traditional	1 st Semester	2 nd Semester	Yearlong	NC Check-In 1 Structure and Function of Living Things
	Oct. 17-28	March 13-24	Dec. 5-16	
Non-Traditional		2 nd Semester	Yearlong	
		Feb. 13-24	Nov. 16-30	

*Please see the assessment description at the bottom of this document.

UNIT	UNIT DURATION	PARENT/FAMILY RESOURCES	NORTH CAROLINA STANDARDS
The Nature of Life	Semester 5 days Yearlong 10 days	Miller & Levine Biology "Honeybee" EBook Chapter 1 The Science of Biology	No identified standards. (Introduction, Scientific Method, Characteristics of Life, Organization of Life, Introduction to 6 Kingdoms)
Structures and Functions of Living Organisms	Semester 8 days Yearlong 16 days	Miller & Levine Biology "Honeybee" EBook Chapter 8 Cell Structure and Function Chapter 8.1 Life is Cellular Chapter 8.2 Cell Structure Chapter 8.3 Cell Transport Chapter 8.4 Homeostasis and Cells	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.1.2.3 Explain how specific cell adaptations help cells survive in particular environments (focus on unicellular organisms). Bio.1.2.1 Explain how homeostasis is maintained in the cell and within an organism in various environments (including temperature and pH).
Molecular Biology	Semester 3 days Yearlong 6 days	Miller & Levine Biology "Honeybee" EBook Chapter 9 Photosynthesis Chapter 10 Cellular Respiration	Bio.4.2 Analyze the relationships between biochemical processes and energy use in the cell. Bio.4.2.2 Explain ways that organisms use released energy for maintaining homeostasis (active transport). Bio.4.2.1 Analyze photosynthesis and cellular respiration in terms of how energy is stored, released, and transferred within and between these systems.



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Molecular Biology	OVERVIEW
	Molecular biology is the field of biology that studies the composition, structure and interactions of cellular molecules, such as nucleic acids and proteins, that carry out the biological processes essential for the cells' functions and maintenance. In this unit, high school biology students will understand how biological molecules are essential to the survival of living organisms and analyze the relationship between biochemical processes and energy use in the cell.

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UNIT	UNIT DURATION	PARENT/FAMILY RESOURCES	NORTH CAROLINA STANDARDS
Molecular Biology	Semester 5 days Yearlong 10 days	Miller & Levine Biology "Honeybee" EBook Chapter 2 The Chemistry of Life	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.4.1.3 Explain how enzymes act as catalysts for biological reactions.
Structures and Functions of Living Organisms	Semester 3 days Yearlong 6 days	Miller & Levine Biology "Honeybee" EBook Chapter 11 Cell Growth and Division	Bio.1.2 Analyze the cell as a living system. Bio.1.2.2 Analyze how cells grow and reproduce in terms of interphase, mitosis and cytokinesis.
Molecular Biology	Semester 2 days Yearlong 4 days	Miller & Levine Biology "Honeybee" EBook Chapter 13 DNA	Bio.4.1 Understand how biological molecules are essential 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 in all organisms.
Evolution and Genetics	Semester 4 days Yearlong 8 days	Miller & Levine Biology "Honeybee" EBook Chapter 14 RNA and Protein Synthesis	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.



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Evolution and Genetics				OVERVIEW
				In this unit, high school biology students will analyze the cell as a living system and understand the relationship between the structures and functions of cells and their organelles. They will understand the application of DNA technology, explain how traits are determined by the structure and function of DNA, and how the environment and/or the interaction of alleles, influences the expression of genetic traits. Students will explain the theory of evolution by natural selection as a mechanism for how species change over time and analyze how classification systems are developed based upon speciation.
ASSESSMENTS				
ASSESSMENT WINDOW				ASSESSMENT NAME
Traditional	1 st Semester	2 nd Semester	Yearlong	NC Check-In 3 Evolution and Genetics
	Dec. 5-16	April 3-21	May 1-12	
Non-Traditional		2 nd Semester	Yearlong	
		April 3-21	April 3-21	

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UNIT	UNIT DURATION	PARENT/FAMILY RESOURCES	NORTH CAROLINA STANDARDS
Structures and Functions of Living Organisms	Semester 1 day Yearlong 2 days	Miller & Levine Biology "Honeybee" EBook Chapter 12 Introduction to Genetics	Bio.1.2 Analyze the cell as a living system. Bio.1.2.2 Analyze how cells grow and reproduce in terms of interphase, mitosis and cytokinesis.
Evolution and Genetics	Semester 11 days Yearlong 22 days	Miller & Levine Biology "Honeybee" EBook Chapter 12 Introduction to Genetics	Bio.3.1 Explain how traits are determined by the structure and function of DNA. 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.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.
Structures and Functions of Living Organisms	Semester 1 day Yearlong 2 days	Miller & Levine Biology "Honeybee" EBook Chapter 11 Cell Growth and Division Lesson 11.4 Cell Differentiation	Bio.1.1 Understand the relationship between the structures and functions of cells and their organelles. 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



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Evolution and Genetics	Semester 5 days Yearlong 10 days	Miller & Levine Biology “Honeybee” EBook Chapter 15 The Human Genome Lesson 15.3 Studying the Human Genome Chapter 16 Biotechnology	Bio.3.2 Understand how the environment, and/or the interaction of alleles, influences the expression of genetic 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).
Evolution and Genetics	Semester 5 days Yearlong 10 days	Miller & Levine Biology “Honeybee” EBook Chapter 17 Darwin’s Theory of Evolution Chapter 18 Evolution of Populations Chapter 20 History of Life Chapter 24 Animal Evolution, Diversity, and Behavior	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.
Evolution and Genetics	Semester 3 days Yearlong 6 days	Miller & Levine Biology “Honeybee” EBook Chapter 19 Biodiversity and Classification Chapter 22 Plants Chapter 23 Plant Structure and Function	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).



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Ecosystems	OVERVIEW
	In this biology unit, students will analyze the interdependence of living organisms with their environments and understand the impact of human activities on the environment.

*Please see the assessment description at the bottom of this document.

UNIT	UNIT DURATION	PARENT/FAMILY RESOURCES	NORTH CAROLINA STANDARDS
Ecosystems	Semester 3 days Yearlong 6 days	Miller & Levine Biology "Honeybee" EBook Chapter 24 Animal Evolution, Diversity, and Behavior	Bio.2.1 Analyze the interdependence of living organisms within their environments. 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.
Ecosystems	Semester 8 days Yearlong 16 days	Miller & Levine Biology "Honeybee" EBook Chapter 3 The Biosphere Chapter 4 Ecosystems Chapter 5 Populations Chapter 6 Communities and Ecosystem Dynamics	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.2.1.3 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).
Ecosystems	Semester 8 days Yearlong 16 days	Chapter 7 Humans and Global Change	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.



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Biology

NC Check-Ins Science

NC Biology Check-Ins are interim assessments aligned to North Carolina grade-level content standards in biology developed by the North Carolina Department of Public Instruction (NCDPI). There are four NC Biology Check-Ins covering each of the four standard domains (Structure and Function of Living Organisms; Ecosystems; Evolution and Genetics; and Molecular Biology).

NC Biology Check-Ins Test Specifications

NC Biology Check-In			
Structure and Function of Living Things (24 Items)	Ecosystems (24 Items)	Evolution and Genetics (39 Items)	Molecular Biology (20 Items)
1.1.1	2.1.1	3.1.1	4.1.1
1.1.2	2.1.2	3.1.2	4.1.2
1.1.3	2.1.3	3.1.3	4.1.3
1.2.1	2.1.4	3.2.1	4.2.1
1.2.2	2.2.1	3.2.2	4.2.2
1.2.3	2.2.2	3.2.3	
		3.3.1	
		3.3.2	
		3.4.1	
		3.4.2	
		3.4.3	
		3.5.1	
		3.5.2	