Engage. Challenge. Inspire.

2023-24 Biology Curriculum Map

<table>
<tr><th colspan="3">Unit One: Nature of Life</th></tr>
<tr><td colspan="3">Chapter One - Foundations of Biology</td></tr>
<tr><td>TN State Standard</td><td>ACT Standard</td><td>Pacing</td></tr>
<tr><td>BIO1.LS1.1
Compare and contrast existing models, identify patterns, and use structural and functional evidence to analyze the characteristics of life. Engage in argument about the designation of viruses as non-living based on these characteristics.</td><td></td><td>
<table>
<tr><td>1.2 Patterns of Life</td><td>1</td></tr>
<tr><td>21.1 Viruses</td><td>2</td></tr>
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1 day for common assessment
<table>
<tr><td>Total Number</td><td>4 days</td></tr>
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</td></tr>
<tr><td colspan="3">Chapter Two- Chemistry of Life</td></tr>
<tr><td>TN State Standard</td><td>ACT Standard</td><td>Pacing</td></tr>
<tr><td>BIO1.LS1.2
Evaluate comparative models of various cell types with a focus on organic molecules that make up cellular structures.

BIO1.LS1.5
Research examples that demonstrate the functional variety of proteins and construct an argument based on evidence for the importance of the molecular structure to its function. Plan and carry out a controlled investigation to test prediction about factors which should cause an effect on the structure and function of a protein.</td><td></td><td>
<table>
<tr><td>2.3 Carbon Compounds</td><td>5</td></tr>
<tr><td>2.4 Chemical Reactions and Enzymes</td><td>2</td></tr>
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1 day for common assessment
<table>
<tr><td>Total Number</td><td>8 days</td></tr>
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Unit Two: Cellular Structure and Transport

Chapter Three: Cellular Structure and Function

TN State Standard	ACT Standard	Pacing
BIO1.LS1.2 Evaluate comparative models of various cell types with a focus on organic molecules that make up cellular structures.		8.1 Life is Cellular — .5 8.2 Cell Structure — 4.5

Chapter Four: Cellular Transport and Homeostasis

TN State Standard	ACT Standard	Pacing
BIO1.LS1.7 Utilize a model of a cell plasma membrane to compare the various types of cellular transport and test predictions about the movement of molecules into or out of a cell based on the homeostasis of energy and matter in cells.		8.3 Cell Transport 8.4 Homeostasis and Cells — 4.5 2.2 Properties of Water — .5 1 day for common assessment **Total Number — 11 days**

Unit Three: DNA and the Cell Cycle

Chapter Five: Cellular Growth and Division

TN State Standard	ACT Standard	Pacing
BIO1.LS1.6 Create a model for the major events of the eukaryotic cell cycle, including mitosis. Compare and contrast the rates of cell division in various eukaryotic cell types in multicellular organisms.		11.1 Cell Growth, Division, and Reproduction — 1 11.2 The Process of Cell Division — 1 11.3 Regulating the Cell Cycle — 1

Chapter Six: DNA, RNA, and Protein Synthesis

TN State Standard	ACT Standard	Pacing
BIO1.LS1.3 Integrate evidence to develop a structural model of a DNA molecule. Using the model, develop and communicate an explanation for how DNA serves as a template for self-replication and encodes biological information. BIO1.LS1.4 Demonstrate how DNA sequence information is decoded through transcriptional processes within the cell in		13.1 Identifying the Substance of Genes — .5 13.2 The Structure of DNA — .5 13.3 DNA Replication — .5 14.1 RNA — .5

order to synthesize proteins. Examine the relationship of structure and function of various types of RNA and the importance of this relationship in these processes. BIO1.LS1.5 Research examples that demonstrate the functional variety of proteins and construct an argument based on evidence for the importance of the molecular structure to its function. Plan and carry out a controlled investigation to test prediction about factors which should cause an effect on the structure and function of a protein. BIO1.LS3.2 Explain how protein formation results in phenotypic variation and discuss how changes in DNA can lead to somatic or germline mutations.		14.2 Ribosomes and Protein Synthesis — 2 14.3 Gene Regulation and Expression — .5 14.4 Mutations — .5 1 day for common assessment **Total Number — 9 days**

Unit Four: Genetics

Chapter Seven: Meiosis

TN State Standard	ACT Standard	Pacing
BIO1.LS3.1 Model chromosome progression through meiosis and fertilization in order to argue how the process of sexual reproduction leads to both genetic similarities and		12.4 Meiosis — 2

variation in diploid organisms. Compare and contrast the processes of sexual and asexual reproduction, identifying the advantages and disadvantages of each.		

Chapter Eight: Mendelian Genetics
Chapter Nine: Human Chromosomes and Disorders

TN State Standard	ACT Standard	Pacing
BIO1.LS3.2 Explain how protein formation results in phenotypic variation and discuss how changes in DNA can lead to somatic or germline mutations. BIO1.LS3.3 Through pedigree analysis, identify patterns of trait inheritance to predict family member genotypes. Use mathematical thinking to predict the likelihood of various types of trait transmission. BIO1.ETS2.1 Obtain, evaluate, and communicate information on how molecular biotechnology may be used in a variety of fields. BIO1.ETS2.2 Investigate means by which karyotypes are utilized in diagnostic medicine.		12.1 The Work of Gregor Mendel — .5 12.2 Applying Mendel's Principles — 1.5 12.3 Other Patterns of Inheritance — 1.5 15.1 Human Chromosomes — .5 15.2 Human Genetic Disorders — .5 15.3 Studying the Human Genome 16.2 The Process of Genetic Engineering 16.3 Applications of Biotechnology — 1

BIO1.ETS2.3 Analyze scientific and ethical arguments to support the pros and cons of applications of a specific biotechnology technique such as stem cell usage, in vitro fertilization, or genetically modified organisms.		16.4 Ethics of Biotechnology 1 day for common assessment **Total Number** **8.5**

Unit Five: Evolution and Biological Change

Chapter Ten: Evidence for Evolution
Chapter Eleven: Population Genetics

TN State Standard	ACT Standard	Pacing
BIO1.LS4.1 Evaluate scientific data collected from analysis of molecular sequences, fossil records, biogeography, and embryology. Identify chronological patterns of change and communicate that biological evolution is supported by multiple lines of empirical evidence that identify similarities inherited from a common ancestor. BIO1.LS4.2 Using a model that demonstrates the change in allele frequencies resulting in evolution of a population over many generations, identify causative agents of change.		17.3 Darwin's Theory: Natural Selection — 1 17.4 Evidence of Evolution — .5 18.1 Genes and Variation — .25 18.2 Evolution as Genetic Change — .25 18.3 The Process of Speciation — .25 18.4 Molecular Evolution — .25

		19.1 and 19.2 Finding Order in Biodiversity and Modern Evolutionary Classification: 1 1 day for common assessment **Total number: 4.5 days**

Unit Six: Ecological Interactions and Energy Dynamics

Chapter Twelve: The Biosphere and Biogeochemical Cycles

TN State Standard	ACT Standard	Pacing
BIO1.LS2.2 Analyze through research the cycling of matter in our biosphere and explain how biogeochemical cycles are critical for ecosystem function. BIO1.LS4.3 Identify ecosystem services and assess the role of biodiversity in support of these services. Analyze the role human activities have on disruption of these services.		3.1 Introduction to Global Systems: .5 4.3 Cycles of Matter: 2

Chapter Thirteen: Photosynthesis and Cellular Respiration

TN State Standard	ACT Standard	Pacing
BIO1.LS1.8 Create a model of photosynthesis demonstrating the net flow of matter and		9.1 Energy and Life: 1

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<td>energy into a cell. Use the model to explain energy transfer from light energy into stored chemical energy in the product.

BIO1.LS1.9
Create a model of aerobic respiration demonstrating flow of matter and energy out of a cell. Use the model to explain energy transfer mechanisms. Compare aerobic respiration to alternative processes of glucose metabolism.</td>
<td></td>
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<table>
<tr><td>9.2 Photosynthesis: An Overview
9.3 The Process of Photosynthesis</td><td>2</td></tr>
<tr><td>10.1 Cellular Respiration: An Overview
10.2 The Process of Cellular Respiration
10.3 Fermentation</td><td>2</td></tr>
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<tr><td colspan="3">Chapter Fourteen: Energy Flow</td></tr>
<tr><td><u>TN State Standard</u></td><td><u>ACT Standard</u></td><td><u>Pacing</u></td></tr>
<tr>
<td>BIO1.LS2.4
Analyze data demonstrating the decrease in biomass observed in each successive trophic level. Construct an explanation considering the laws of conservation of energy and matter and represent this phenomenon in a mathematical model to describe the transfer of energy and matter between trophic levels.</td>
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<table>
<tr><td>4.1 Energy, Producers, and Consumers</td><td>.5</td></tr>
<tr><td>4.1 Energy Flow in Ecosystems</td><td>.5</td></tr>
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<tr><td colspan="3">Chapter Fifteen: Community Ecology</td></tr>
<tr><td><u>TN State Standard</u></td><td><u>ACT Standard</u></td><td><u>Pacing</u></td></tr>
<tr><td>BIO1.LS2.5</td><td></td><td></td></tr>
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<td>Analyze examples of ecological succession, identifying and explaining the order of events responsible for the formation of a new ecosystem in response to extreme fluctuations in environmental conditions or catastrophic events.</td>
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<table>
<tr><td>6.1 Habitats, Niches, and Species Interactions</td><td>1</td></tr>
<tr><td>6.2 Succession</td><td>1</td></tr>
<tr><td>6.3 Biodiversity, Ecosystems, and Resilience</td><td>.5</td></tr>
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<tr><td colspan="3">Chapter Sixteen: Population Ecology</td></tr>
<tr><td><u>TN State Standard</u></td><td><u>ACT Standard</u></td><td><u>Pacing</u></td></tr>
<tr>
<td>BIO1.LS2.1
Analyze mathematical and/or computational representations of population data that support explanations of factors that affect population size and carrying capacities of populations within an ecosystem. Examine a representative ecosystem and based on interdependent relationships present, predict population size effects due to a given disturbance.</td>
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<table>
<tr><td>5.1 How Populations Grow</td><td>.5</td></tr>
<tr><td>5.2 Limits to Growth</td><td>1</td></tr>
<tr><td>5.3 Human Population Growth</td><td>.5</td></tr>
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1 day for common assessment
<table>
<tr><td>Total number</td><td>14</td></tr>
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