Shepard Preparatory High School

Biology Curriculum

Biology

Unit 1	
Principles of Ecology	
Timeframe	September through mid-November (10-12 weeks)
Unit Overview	Students will gain an understanding of ecosystems, biodiversity, conservation, population dynamics, and human influence on ecosystems.
Essential Questions	1. What are the interactions between levels of biological communities? 2. How does energy flow through an ecosystem? 3. How do communities interact to maintain homeostasis in ecosystems?
Unit Focus	• Energy is required to cycle materials through living and nonliving systems • Limiting factors and ranges of tolerance are factors that determine where terrestrial biomes and aquatic ecosystems exist • Population growth is a critical factor in a species' ability to maintain homeostasis within its environment • Community and ecosystem homeostasis depend on a complex set of interactions among biologically diverse individuals
Interdisciplinary Connections	Social Studies • RH.11-12.1. Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of primary and secondary sources, connecting insights gained from specific details to develop an understanding of the text as a whole. 21st Century Life Skills and Careers • CRP11 Use technology to enhance productivity. • CRP12. Work productively in teams while using cultural global competence
Common Assessments	• Pre- Assessment: Students demonstrate prior knowledge of the variety of animal and plant life on earth • Unit project: Report and accompanying PowerPoint on an endangered species • End of Unit Assessment: Students demonstrate in-depth knowledge of ecosystem diversity, species diversity, and conservation (teacher devised tests)

Materials	
Common Materials	**Supplemental Materials**
Glencoe Science - Biology text *ConnectED programs Glencoe Biology*	National Geographic Education materials (videos, infographics, activities, etc.) Thirteen.org/Nature videos, supplemental materials News articles

New Jersey Student Learning Standards (NJSLS)			
Subject Area Biology/Ecology	**Technology** *8.1: Educational Technology* *8.2: Technology Education, Engineering, Design and Computational Thinking - Programming*	**21st Century Life and Careers** *Career Ready Practices* *9.1: Personal Financial Literacy* *9.2: Career Awareness, Exploration, and Preparation*	**ELA Companion** *Secondary Science and Social Studies Only*
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. HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	**8.1** Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. **8.2** Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.	CRP 2. Apply appropriate academic and technical skills. CRP 4. Communicate clearly and effectively and with reason. CRP 5. Consider the environmental, social, and economic impacts of decisions. CRP 11. Use technology to enhance productivity.	RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions. RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the

HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.			subject under investigation.

Differentiation

Differentiation for Support and General Curriculum (504, ELL, Special Education, Struggling Learners)	Differentiation for Enrichment
Modifications for Classroom: Pair visual prompts with verbal presentations Ask students to restate information, directions, and assignments Model skills / techniques to be mastered Extended time to complete class work Student-directed learning/ independent studies when appropriate **Modifications for Homework and Assignments**: Extended time to complete assignments Provide the student with clearly stated (written) expectations and grading criteria for assignments **Modifications for Assessments:** Extended time on classroom assessments **Further Modifications for General Curriculum students:** Students on the General curriculum will have selected goals removed as per their IEP in order to facilitate mastery of foundational skills and allow more instructional time for re-teaching, review, and remediation. See Goals & Objectives for specific goals and objectives for General Curriculum students.	Use of higher-level questioning techniques Provide assessments that require higher-level thinking Increased production in writing assignments Substituting written texts with project-based learning Student-directed learning/ independent studies Extension activities

Unit 2	
The Cell	
Timeframe	Mid-November through January (10-12 weeks)
Unit Overview	Students will gain an understanding of cell structure and function, cellular energy processes, and cell reproduction.
Essential Questions	1. What is the structure of a cell and what processes do the principle cell structures perform? 2. What are photosynthesis and cellular respiration? 3. What is the life cycle of a cell?
Unit Focus	• Atoms are the foundation of biological chemistry and the building blocks of all living organisms • Cells are the structural and functional units of all living organisms • Photosynthesis converts the sun's energy into chemical energy, while cellular respiration uses chemical energy to carry out life functions • Cells go through a life cycle that includes interphase, mitosis and cytokinesis
Interdisciplinary Connections	Social Studies • RH.11-12.1. Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of primary and secondary sources, connecting insights gained from specific details to develop an understanding of the text as a whole. 21st Century Life Skills and Careers • CRP11 Use technology to enhance productivity. • CRP12. Work productively in teams while using cultural global competence
Common Assessments	• Pre- Assessment: Students demonstrate prior knowledge of the definition of a living thing, and that all living things are made of cells • Laboratory procedures and reports • End of Unit Assessment: Students demonstrate knowledge of cell structure and function, cell processes, and cell reproduction (teacher devised tests)
Materials	
Common Materials	

	Supplemental Materials
Glencoe Science - Biology text *ConnectED programs Glencoe Biology*	Additional lab manuals News articles

New Jersey Student Learning Standards (NJSLS)			
Subject Area Biology (the cell)	**Technology** *8.1: Educational Technology* *8.2: Technology Education, Engineering, Design and Computational Thinking - Programming*	**21st Century Life and Careers** *Career Ready Practices* *9.1: Personal Financial Literacy* *9.2: Career Awareness, Exploration, and Preparation*	**ELA Companion** *Secondary Science and Social Studies Only*
HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. HS-LS1-7. Use a model to illustrate that cellular	**8.1** Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. **8.2** Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the	CRP 2. Apply appropriate academic and technical skills. CRP 4. Communicate clearly and effectively and with reason. CRP 5. Consider the environmental, social, and economic impacts of decisions. CRP 11. Use technology to enhance productivity.	RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions. RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

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.	individual, global society, and the environment.		

Differentiation

Differentiation for Support and General Curriculum (504, ELL, Special Education, Struggling Learners)	Differentiation for Enrichment
Modifications for Classroom: Pair visual prompts with verbal presentations Ask students to restate information, directions, and assignments Model skills / techniques to be mastered Extended time to complete class work Student-directed learning/ independent studies when appropriate **Modifications for Homework and Assignments**: Extended time to complete assignments Provide the student with clearly stated (written) expectations and grading criteria for assignments **Modifications for Assessments:** Extended time on classroom assessments **Further Modifications for General Curriculum students:** Students on the General curriculum will have selected goals removed as per their IEP in order to facilitate mastery of foundational skills and allow more instructional time for re-teaching, review, and remediation. See Goals & Objectives for specific goals and objectives for General Curriculum students.	Use of higher-level questioning techniques Provide assessments that require higher-level thinking Increased production in writing assignments Substituting written texts with project-based learning Student-directed learning/ independent studies Extension activities

Biology

Unit 3	
Genetics	
Timeframe	February through mid-April (10 weeks)
Unit Overview	Students will gain an understanding of sexual reproduction and genetics; inheritance and human heredity; and molecular genetics.
Essential Questions	1. How are reproductive cells formed by the process of meiosis? 2. How are traits inherited? 3. What is DNA and how does it code for the necessary proteins?
Unit Focus	• Reproductive cells are produced by meiosis • Genetic traits are passed from parents to offspring • Genetic patterns can be analyzed to determine dominant and recessive inheritance patterns • Complex inheritance of traits does not follow patterns described by Mendel • DNA is the genetic material that contains codes for proteins
Interdisciplinary Connections	Social Studies • RH.11-12.1. Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of primary and secondary sources, connecting insights gained from specific details to develop an understanding of the text as a whole. 21st Century Life Skills and Careers • CRP11 Use technology to enhance productivity. • CRP12. Work productively in teams while using cultural global competence
Common Assessments	• Pre- Assessment: Students demonstrate some prior understanding that our traits are inherited from prior generations • Laboratory procedures and reports • End of Unit Assessment: Students demonstrate knowledge of inheritance and molecular genetics (teacher devised tests)

Materials	
Common Materials	**Supplemental Materials**
Glencoe Science - Biology text	Additional lab manuals

ConnectED programs Glencoe Biology	News articles

New Jersey Student Learning Standards (NJSLS)			
Subject Area Biology/genetics	**Technology** *8.1: Educational Technology* *8.2: Technology Education, Engineering, Design and Computational Thinking - Programming*	**21st Century Life and Careers** *Career Ready Practices* *9.1: Personal Financial Literacy* *9.2: Career Awareness, Exploration, and Preparation*	**ELA Companion** *Secondary Science and Social Studies Only*
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. HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	**8.1** Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. **8.2** Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.	CRP 2. Apply appropriate academic and technical skills. CRP 4. Communicate clearly and effectively and with reason. CRP 5. Consider the environmental, social, and economic impacts of decisions. CRP 11. Use technology to enhance productivity.	RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions. RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.			

Differentiation	
Differentiation for Support and General Curriculum (504, ELL, Special Education, Struggling Learners)	**Differentiation for Enrichment**
Modifications for Classroom: Pair visual prompts with verbal presentations Ask students to restate information, directions, and assignments Model skills / techniques to be mastered Extended time to complete class work Student-directed learning/ independent studies when appropriate **Modifications for Homework and Assignments**: Extended time to complete assignments Provide the student with clearly stated (written) expectations and grading criteria for assignments **Modifications for Assessments:** Extended time on classroom assessments **Further Modifications for General Curriculum students:** Students on the General curriculum will have selected goals removed as per their IEP in order to facilitate mastery of foundational skills and allow more instructional time for re-teaching, review, and remediation. See Goals & Objectives for specific goals and objectives for General Curriculum students.	Use of higher-level questioning techniques Provide assessments that require higher-level thinking Increased production in writing assignments Substituting written texts with project-based learning Student-directed learning/ independent studies Extension activities

Unit 4	
Evolution	
Timeframe	Mid-April through June (10 weeks)
Unit Overview	Students will gain an understanding of the origins of life, the theory of evolution, natural selection and the diversity of life.
Essential Questions	1. How do fossils provide evidence for the origin and history of life on earth? 2. How does the theory of evolution, supported by natural selection, explain the diversity of life? 3. How did evolutionary change lead to a diversity of species that includes modern humans?
Unit Focus	• Fossils provide evidence of the change in organisms over time • A sequence of chemical events preceded the origins of life on earth • Darwin's studies led to the theory of evolution by natural selection • Primates share several behavioral and biological characterizations, which indicates that they evolved from a common ancestor • Natural selection results in the evolution of new species
Interdisciplinary Connections	Social Studies • RH.11-12.1. Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of primary and secondary sources, connecting insights gained from specific details to develop an understanding of the text as a whole. 21st Century Life Skills and Careers • CRP11 Use technology to enhance productivity. • CRP12. Work productively in teams while using cultural global competence
Common Assessments	• Pre- Assessment: Students demonstrate prior understanding that life on earth has changed over the course of time • Unit project: Report and PowerPoint on evolutionary adaptations of an organism • End of Unit Assessment: Students demonstrate knowledge of evolution and natural selection (teacher devised tests)
Materials	
Common Materials	**Supplemental Materials**

Biology

Glencoe Science - Biology text *ConnectED programs Glencoe Biology*	National Geographic Education materials (videos, infographics, activities, etc.) Thirteen.org/Nature videos, supplemental materials News articles

New Jersey Student Learning Standards (NJSLS)			
Subject Area Biology/evolution	**Technology** *8.1: Educational Technology* *8.2: Technology Education, Engineering, Design and Computational Thinking - Programming*	**21st Century Life and Careers** *Career Ready Practices* *9.1: Personal Financial Literacy* *9.2: Career Awareness, Exploration, and Preparation*	**ELA Companion** *Secondary Science and Social Studies Only*
HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (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	**8.1** Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. **8.2** Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design,	CRP 2. Apply appropriate academic and technical skills. CRP 4. Communicate clearly and effectively and with reason. CRP 5. Consider the environmental, social, and economic impacts of decisions. CRP 11. Use technology to enhance productivity.	RST.9-10.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions. RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	computational thinking and the designed world as they relate to the individual, global society, and the environment.		

Differentiation	
Differentiation for Support and General Curriculum (504, ELL, Special Education, Struggling Learners)	**Differentiation for Enrichment**
Modifications for Classroom: Pair visual prompts with verbal presentations Ask students to restate information, directions, and assignments Model skills / techniques to be mastered Extended time to complete class work Student-directed learning/ independent studies when appropriate **Modifications for Homework and Assignments**: Extended time to complete assignments	Use of higher-level questioning techniques Provide assessments that require higher-level thinking Increased production in writing assignments Substituting written texts with project-based learning Student-directed learning/ independent studies Extension activities

Provide the student with clearly stated (written) expectations and grading criteria for assignments **Modifications for Assessments:** Extended time on classroom assessments **Further Modifications for General Curriculum students:** Students on the General curriculum will have selected goals removed as per their IEP in order to facilitate mastery of foundational skills and allow more instructional time for re-teaching, review, and remediation. See Goals & Objectives for specific goals and objectives for General Curriculum students.	