Biology

Grade 9

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Biology

Course Description:

HS Biology Curriculum Overview

High School Biology is taught in five units throughout the school year. The curriculum is a full integration of the practices of science with its ideas and all major biological concepts. Students will learn the idea of science/biology through actually doing science/biology. High School Biology is a laboratory science course in which students investigate biological concepts and practice scientific skills. Students will investigate Cycles of Matter and Energy Transfer in Ecosystems: How do matter and energy move through ecosystems? And how do organisms interact with the living and nonliving environment. The next disciplinary core idea discussed will be: Ecosystem Dynamics, Functioning and Resilience: What happens to ecosystems when the environment changes? Structure and Function or How do the structures of organisms enable life's functions? Will be explored by the students in Unit 3. The study of Genetics asks questions about the Variation of Traits: Why do individuals of the same species vary in how they look, function and behave? Evolution is the central theme of all biology, and it is the core theme of the course and will be discussed and emphasized throughout all projects!

Aspects of physical science; chemistry and biochemistry; earth & space science; and engineering, technology & applications of science are taught throughout the year. A guided inquiry program, problem-based learning experiences and engineering projects will give students the opportunity to explore topics and concepts through investigations. Participating in this hands-on program helps students:

1. To be prepared for College/Career by emphasizing key skills and practices (NGSS, CCSS, STEM).
2. Become lifelong learners and engaged citizens.

Course Sequence*:

Unit 1: **Matter and Energy Transformations in Ecosystems and Interdependent Relationships in Ecosystems: 45 days**
Unit 2: **Human Activity and Climate and Biodiversity: 38 days**
Unit 3: **Cell Specialization and Homeostasis: 42 days**
Unit 4: **DNA and Inheritance: 27 days**
Unit 5: **Natural Selection and Evolution: 30 days**

Pre-Requisites:

Middle School Science Program

**The number of instructional days is an estimate based on the information available at this time. 1 day equals approximately 48 minutes of seat time. Teachers are strongly encouraged to review the entire unit of study carefully and collaboratively to determine whether adjustments to this estimate need to be made.*

Unit # - Overview
Content Area: Biology
Unit Title: Matter and Energy Transformations in Ecosystems and Interdependent Relationships in Ecosystems
Grade Level: 9
Core Ideas: **Unit Summary: In this unit of study, students construct explanations for the role of energy in the cycling of matter in organisms and ecosystems. They apply mathematical concepts to develop evidence to support explanations of the interactions of photosynthesis and cellular respiration, and they will develop models to communicate these explanations. Students also understand organisms' interactions with each other and their physical environment and how organisms obtain resources. Students utilize the crosscutting concepts of matter and energy and systems, and system models to make sense of ecosystem dynamics. Students are expected to use student constructed explanations for the role of energy in the cycling of matter in organisms and ecosystems. They apply mathematical concepts to develop evidence to support explanations as they demonstrate their understanding of the disciplinary core ideas.** **Students will also formulate answers to the question "how and why do organisms interact with each other (biotic factors) and their environment (abiotic factors), and what affects these interactions?" Secondary ideas include the interdependent relationships in ecosystems; dynamics of ecosystems; and functioning, resilience, and social interactions, including group behavior. Students use mathematical reasoning and models to make sense of carrying capacity, factors affecting biodiversity and populations, the cycling of matter and flow of energy through systems. The crosscutting concepts of scale, proportion, quantity and stability and change are called out as organizing concepts for the disciplinary core ideas. Students are expected to use mathematical reasoning and models to demonstrate proficiency with the disciplinary core ideas.**

Unit # - Standards	
Standards (Content and Technology)**:**	
	Performance Expectations (NGSS)
HS-LS2-1	**Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.**
HS-LS-2-2	**Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.**
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.**
Science & Engineering Practices	**-Use mathematical and/or computational representations of phenomena or design solutions to support explanations.** **-Use mathematical representations of phenomena or design solutions to support and revise explanations.**
Disciplinary Core Ideas LS2.A	**Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations the can support. These limits result from such factors as the availability of lining and nonliving resources and from such challenges such as predation, competition and disease. Organisms would have the capacity to produce populations of great size were it not for the fact**

	that environments and resources are finite This fundamental tension affects the abundance(number of individuals) of species in any given ecosystem.
Disciplinary Core Ideas HS-LS2-A	**Provide evidence that the growth of populations is limited by access to resources, and how selective pressures may reduce the number of organisms or eliminate whole populations of organisms. Graph real or simulated populations and analyze the trends to understand consumption patterns and resource availability, and make prediction**
Crosscutting Concepts	**-The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.** **-Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.**
Connections to Nature of Science	**Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence.**
Career Readiness, Life Literacies, and Key Skills	
9.2.12.CAP.5:	**Assess and modify a personal plan to support current interests and postsecondary plans**
9.4.12.CT.1	**Identify problem-solving strategies used in the development of an innovative product or practice**
9.4.12.CT.2	**Explain the potential benefits of collaborating to enhance critical thinking and problem solving**
9.2.12.CAP.6	**Identify transferable skills in career choices and design alternative career plans based on those skills**
Computer Science and Design Thinking	
8.1.12.DA.1	**Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.**
8.2.12.ED.1	**Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.**
8.2.12.ETW.2	**Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment.**
8.2.12.EC.3	**Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.**
Cross-cultural Statements/Mandates (Amistad, Holocaust, LGBT, etc…)	
	● **Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)** ● **Develop, implement and model effective problem solving and critical thinking skills (CASEL)** ● **Highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance.(C.18A:35-4.36a)[African American Scientists: George Washington Carver, Botanist; Alexa Canady, Neurosurgeon; Katherine Johnson, Mathematician; LGBTQ+ Scientists: Alan Turing, Mathematician; Frieda Fraser, Physician-infectious diseases; Scientists with disabilities: Stefen Hawking' theoretical physicist; Nikolaas Tinbergen, Ethologist}** ● **Examine the impact that unconscious bias and economic disparities have at both an individual level and on society.** ● **Encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs** **The students will be able to discuss/explore the contribution of members of the LGBTQ+ community and minorities to Science and Society.**
Interdisciplinary Connection	
NJSLS.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
NJSLS.A-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression
NJSLS.A-CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
Companion Standards ELA/L	

NJSLSA.R1.	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
NJSLSA.R2.	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
NJSLSA.R4	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem
WHST.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.
WHST.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Unit Essential Question(s):	**Unit Enduring Understandings:**
• **Why are the properties of water important to organisms?** • **How do organisms use different types of carbon compounds?** • **How do chemicals combine and break apart inside living things?** • **How do living and nonliving parts of Earth interact and affect the survival of organisms?** • **How do plants and other organisms capture the energy from the sun?** **How do organisms store and obtain energy?**	• **Organisms need to obtain and use matter and energy to live and grow.** • **The existence of life on earth depends on interactions among organisms and between organisms and their environment.**

Evidence of Learning

Formative Assessments:
Quizzes, homework, classwork, tests, Laboratory assignments, PBL's, Engineering Projects;
Summative/Benchmark Assessments:
Test, PBLs and Engineering Projects

Alternative Assessments:
Portfolio (scientific sketches, outlines and essays to show understanding of major concepts, models)

Resources/Materials:	**Key Vocabulary:**
Textbook, online resources (The American Biology Teacher, HHMI Publications, Science Times etc.) **Leaf Photosynthesis NetLogo Model** **Surviving Winter in the Dust Bowl (Food Chains and Trophic Levels)** https://engage.intel.com/docs/DOC-51219 www.pearsonsuccessnet.com www.discoverystreaming.com www.tryengineering.org www.teachengineering.org	**Biosphere** **Atmosphere** **Hydrosphere** **Geosphere** **Organisms** **Cycling of matter** **Flow of Energy** **Photosynthesis** **Cellular Respiration**

Suggested Pacing Guide

Lesson Name/Topic	**Student Learning Objective(s)**	**Suggested Tasks/Activities:**	**Day(s) to Complete**
Changes in the Bay or Energy Flow in Ecosystems	**Students will construct and revise explanations based on evidence for the flow of energy**	Ecosystem Change	4

Cycles of Matter	**Students will construct and revise explanations based on evidence for the cycling of matter**	Cycle of matter in an ecosystem	4
The Process that feeds the world	**Students will develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon.**	Role of Photosynthesis	12
Disappearing mussels (PBL)	**Design, evaluate and refine a solution for reducing the impacts of human activities on the environment and biodiversity**	Impacts of humans on environment	2
A Plague of Rabbits or how populations grow	**Students will use mathematical representations to support explanations that affect carrying capacity of ecosystems**	Ecosystem carrying capacity	6
The wolf effect or ecosystems and communities	**Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce**	Group Behavior	6
What is ecological succession?	**Evaluate claims, evidence and reasoning that changing conditions may result in a new ecosystem**	Ecological Succession	3
Biomes in Action	**Design biome presentations and create newspaper/magazine pages to inform the public about threads to the biomes**	Design a biome	8 (PBL)

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Hands on activity **-Cooperative Learning** **-Peer Tutoring** **-Extended Time** **-Reteach in various methods** **-Rephrase questions, directions**	**-Hands-on activities** **-Assess comprehension through demonstration** **-Give instruction/directions in writing & oral -Allow errors in speaking** • Provide students with multiple choices for how	**-Provide extension activities per student interest** **-Build on students' intrinsic motivation** • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory	**-Hands on Activity - Cooperative Learning** **-Reteach in various methods** • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-	**-Hands on Activity - Cooperative Learning** **-Reteach in various methods** **-Extended time** **-Rephrase questions, directions, and explanations** • Provide students with multiple

• Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).

Unit # - Overview
Content Area: Biology
Unit Title: : Human Activity and Climate and Biodiversity
Grade Level: 9
Unit Summary: **In this unit of study, students examine factors that have influenced the distribution and development of human society; these factors include climate, natural resource availability, and natural disasters. Students use *computational representations* to analyze how earth systems and their relationships are being modified by human activity. Students also develop an understanding of how human activities affect natural resources and of the interdependence between humans and Earth's systems, which affect the availability of natural resources. Students will apply their engineering capabilities to reduce human impacts on earth systems and improve social and environmental cost–benefit ratios. The crosscutting concepts of *cause and effect*, *systems and systems models*, *stability and change*, and *the influence of engineering, technology, and science on society and the natural world* are called out as organizing concepts for the disciplinary core ideas. Students will analyze and interpret data, use mathematical and computational thinking, and construct explanations as they demonstrate an understanding of the disciplinary core ideas.** **The students will use *mathematical models to* provide support for the conceptual understanding of systems and students' ability to *design, evaluate, and refine solutions* for reducing the impact of human activities on the environment and maintaining biodiversity. Students create or revise a simulation to test solutions for mitigating adverse impacts of human activity on biodiversity. Crosscutting concepts of *systems and system models* play a central role in students' understanding of science and engineering practices and core ideas of ecosystems. Mathematical models also provide support for students' conceptual understanding of systems and their ability to develop design solutions for reducing the impact of human activities on the environment and maintaining biodiversity.**

Unit # - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	

HS-ESS3-1	**Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.**
HS-ESS3-3	**Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.**
HS-ESS3-6	**Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.**
HS-ESS3-5	**Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.**
HS-ESS3-4	**Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.**
HS-ETS1-3	**Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.**
HS-LS2-7	**Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.**
HS-LS4-6	**Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.**
HS-ETS1-1	**Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.**
HS-ETS1-2	**Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.**
HS-ETS1-3	**Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.**
HS-ETS1-4	**Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.**
Science & Engineering Practices	**-Analyze complex real-world problems by specifying criteria and constraints for successful solutions.** **-Use mathematical models and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems.** **-Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.**
Disciplinary Core Ideas 1.A	**-Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.** **-Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.**
Disciplinary Core Ideas ETS1.B	When evaluating solutions, it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts.
Crosscutting Concepts	-Much of science deals with constructing explanations of how things change and how they remain stable. -Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. -Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions–including energy, matter, and information flows-within and between systems at different scales.
Career Readiness, Life Literacies, and Key Skills	
9.2.12.CAP.5:	**Assess and modify a personal plan to support current interests and postsecondary plans**

9.4.12.CT.1	**Identify problem-solving strategies used in the development of an innovative product or practice**
9.4.12.CT.2	**Explain the potential benefits of collaborating to enhance critical thinking and problem solving**
9.2.12.CAP.6	**Identify transferable skills in career choices and design alternative career plans based on those skills**
Computer Science and Design Thinking	
8.1.12.DA.1	**Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.**
8.2.12.ED.1	**Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.**
8.2.12.ETW.2	**Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment.**
8.2.12.EC.3	**Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.**
8.2.12.ED.4	**Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.**
Cross-cultural Statements/Mandates (Amistad, Holocaust, LGBT, etc…)	
	● **Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)** ● **Develop, implement and model effective problem solving and critical thinking skills (CASEL)** ● **Highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance.(C.18A:35-4.36a)[African American Scientists: George Washington Carver, Botanist; Alexa Canady, Neurosurgeon; Katherine Johnson, Mathematician; LGBTQ+ Scientists: Alan Turing, Mathematician; Frieda Fraser, Physician-infectious diseases; Scientists with disabilities: Stefan Hawking' theoretical physicist; Nikolaas Tinbergen, Ethologist}** ● **Examine the impact that unconscious bias and economic disparities have at both an individual level and on society.** ● **Encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs** **The students will be able to discuss/explore the contribution of members of the LGBTQ+ community and minorities to Science and Society.**
Interdisciplinary Connection	
NJSLSA.R7.	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
NJSLSA.R10.	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
NJSLSA.W1.	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
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.
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
RST.9-10.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.
WHST.9-10.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.9-10.6	Use technology, including the Internet, to produce, share, and update writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Companion Standards ELA/L	
NJSLSA.R1.	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
NJSLSA.R2.	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
NJSLSA.R4	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem
WHST.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.
WHST.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Unit Essential Question(s):

- **How does human activities affect the biosphere?**
- **What are Threats to biodiversity?**
- **How does human activities affect soil/land, water and air resources?**
- **What role do ecologists play in a sustainable future?**

Unit Enduring Understandings:

- **Investigate how human activities can affect the biosphere.**
- **Investigate how human activities affect soil/land, water and air resources.**
- **Identify current threats to biodiversity.**
- **Investigate and describe how biodiversity can be preserved.**
- **Identify the role of ecologists in a sustainable future.**
- **Analyze and evaluate data and scientific publications.**
- **Create a controlled experiment to solve a real-world problem.**
- **Design an Algae Farm to solve a real-world global problem.**
- **Apply all their knowledge/skills to unfamiliar questions/problems**

Evidence of Learning

Formative Assessments: Quizzes, homework, classwork, tests, Laboratory assignments, PBL's, Engineering Projects;

Summative/Benchmark Assessment(s): Test, PBLs and Engineering Projects

Alternative Assessments: Portfolio (scientific sketches, outlines and essays to show understanding of major concepts, models)

Resources/Materials:
Textbook, online resources (The American Biology Teacher, HHMI Publications, Science Times etc.)
www.pearsonsuccessnet.com
www.discoverystreaming.com
www.tryengineering.org
www.teachengineering.org

Key Vocabulary:
Biodiversity
Biodiversity Preservation
Biosphere
Sustainability
Ecologist

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Moving the Moai	**Solve the mystery how the Rapa Nui moved the stones**	Rapa Nui moved the stones	6
Case Study: Global Climate Change	**Create an explanation based on evidence to show how human activity influences earth's atmosphere**	Human activity and earth's atmosphere	4
Case Study: Atmospheric Ozone	**Use a computer simulation to investigate the ozone layer**	The Ozone layer	4
Case Study: North Atlantic Fisheries	**Use data to describe the problem of overfishing**	Overfishing problems	4
Global Climate Change: Algae to the rescue	**Design the model of an algae farm to reduce the carbon dioxide output**	Design an algae farm	15 (engineering project)
Ecological Footprint	**Use a computer simulation to calculate their ecological footprint and test solutions**	Ecological Footprint	2
What is acid rain?	**Assess the effects of acid rain.**	Effects of Acid Rain	3 (Laboratory activity)

Teacher Notes:

Additional Resources:

Differentia Differentiation/Modification Strategies tion/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Hands on activity - Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase Questions ● **-** Use project-based science learning to connect science with observable phenomena.	**-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking** ● Provide students with multiple choices for how they can represent their understandings	**-Provide extension activities per student interest -Build on students' intrinsic motivation** ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques-auditory/visual aids; pictures,	**-Hands on Activity - Cooperative Learning -Reteach in various methods -Extended time** ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques-auditory/visual	**-Hands on Activity - Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations** ● Provide students with multiple choices for how they can represent their understandings

● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	(e.g., multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	illustrations, graphs, charts, data tables, multimedia, modeling).	aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	(e.g., multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).

Unit - Overview	
Content Area: Biology	
Unit Title: Cell Specialization and Homeostasis	
Grade Level: 9	
Core Ideas: **Unit Summary:** **Students formulate an answer to the question "How do the structures of organisms enable life's functions?" Students investigate explanations for the structure and functions of cells as the basic unit of life, of hierarchical organization of interacting organ systems, and of the role of specialized cells for maintenance and growth. The crosscutting concepts of structure and function, matter and energy, and systems and system models are called out as organizing concepts for the disciplinary core ideas. Students use critical reading, modeling, and conducting investigations. Students also use the science and engineering practices to demonstrate understanding of the disciplinary core ideas.**	
Unit # - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
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-LS1-2	**Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms**
HS-LS1-3	**Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.**
HS-LS1-4	**Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.**

Science & Engineering Practices	**-Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.** **-Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.**
Disciplinary Core Ideas LS1.A	**-Systems of specialized cells within organisms help them perform the essential functions of life.** **-All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.** **-Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.**
Crosscutting Concepts	**Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions-including energy, matter, and information flows-within and between systems at different scales.** **-Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.**
Career Readiness, Life Literacies, and Key Skills	
9.1.12.EG.3	Explain how individuals and businesses influence government policies.
9.1.12. FP.3	Relate the concept of delayed gratification (i.e., psychological distance) to meeting financial goals, investing and building wealth over time.
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze and use creative skills and ideas.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills and abilities
Computer Science and Design Thinking	
8.1.12.IC.1	Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
8.1.12.IC.2	Test and refine computational artifacts to reduce bias and equity deficits.
8.1.12.IC.3	Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.
8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies have had on innovation and on a society's economy, politics, and culture.
8.2.12.ETW.4	Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints.
8.2.12. ED.2	**Create scaled engineering drawings for a new product or system and make modifications to increase optimization based on feedback.**
Cross-cultural Statements/Mandates (Amistad, Holocaust, LGBT, etc...)	
Reflect on the influence that Hispanic Americans; Blind, Deaf & Hard of Hearing Americans; members of the AAPI, the LGBTQ and handicapped community has had on our knowledge and understanding of kinematics	
Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)	
Develop, implement and model effective problem solving and critical thinking skills (CASEL)	
7.1.AL. IPRET.1	Identify main ideas and significant details in a range of oral, viewed, and written texts.
7.1.AL. IPRET.9	Differentiate facts from opinions by accurately answering most questions that require inferring implied meanings.
Interdisciplinary Connection	
SL.9-10.4:	"Present information, findings, and supporting evidence clearly, concisely, and logically…"
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
RST.9-10.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

WHST.9-10.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.9-10.6	Use technology, including the Internet, to produce, share, and update writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
Companion Standards ELA/L	
NJSLSA.R1.	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
NJSLSA.R2.	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
NJSLSA.R4	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
RST.9-10.1	Accurately cite strong and thorough textual evidence from the text to support analysis of science and technical tests, attending to precise details for explanations or descriptions.
RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or preforming technical tasks, attending to special cases or exceptions defined in the text.

Unit Essential Question(s):	**Unit Enduring Understandings:**
● **Why is it important to study cells?** ● **What are the basic chemical principles that affect living things?** ● **What is the matter in organisms made of?** ● **How do organisms use different types of carbon compounds?** ● **How do chemicals combine and break apart inside living things?** ● **How does a cell transport material across a cell membrane and maintain homeostasis?** ● **How does a cell produce a new cell?** ● **How does a cell control the process of cell division?**	● **Structure and function: the structures of organisms enable life's functions.** ● **The processes that occur at the cellular level provide the energy and basic structure organisms need to survive.** ● **How does a single undifferentiated cell lead to a complex multicellular organism?**

Evidence of Learning

Formative Assessments: Quizzes, homework, classwork, tests, Laboratory assignments, PBL's, Engineering Projects.

Summative/Benchmark Assessment(s): Test, PBLs and Engineering Projects

Alternative Assessments: (scientific sketches, outlines and essays to show understanding of major concepts, models)

Resources/Materials:	**Key Vocabulary:**
Textbook, online resources (The American Biology Teacher) www.pearsonsuccessnet.com www.discoverystreaming.com www.tryengineering.org www.teachengineering.org	**Prokaryotes** **Eukaryotes** **Cell Organelles** **Passive/Active Transport** **Unicellular/Multicellular** **ATP** **Sexual/Asexual reproduction** **Cell cycle** **Macromolecules** **DNA** **Protein Synthesis**

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Harnessing the fear of water	**Develop models to explain hydrophobicity**	What is hydrophobicity	4 PBL/Engineering Project
Healthy Schools	**Create a public announcement to improve the eating habits at school**	Develop a public announcement about eating habits	10 PBL
The ghostly fish	**Solve a real-world problem**	Solve a real-world mystery	5-day Mystery
Maxed out muscles	**Create a fitness plan that explain the causes of muscle fatigue**	Muscle Fatigue fitness plans	3PBL
Death by ...water?	**Explain how a marathon runner can experience death by drinking water**	Body homeostasis	2-day mystery
What is homeostasis ?	**Explain how cells and organisms maintain homeostasis**	Maintaining homeostasis	4
DNA- structure and function	**Create a model to explain the structure of DNA**	Structure of DNA	4
The Cell Cycle	**Create a model of the cell cycle and demonstrate the importance of cellular division**	Video/Cartoon project	5 Video/Cartoon project
Teacher Notes:			
Additional Resources:			

Differentia Differentiation/Modification Strategies tion/Modification Strategies				
Students with Disabilities	**English Language Learners**	**Gifted and Talented Students**	**Students at Risk**	**504 Students**
Hands on activity - Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase Questions ● **-** Use project-based science learning to connect science	**-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking** ● Provide students with multiple choices for how they can	**-Provide extension activities per student interest -Build on students' intrinsic motivation** ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques- auditory/visual	**-Hands on Activity - Cooperative Learning -Reteach in various methods -Extended time** ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory	**-Hands on Activity - Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations** ● Provide students with multiple choices for how they can

with observable phenomena. ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	represent their understandings (e.g., multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	represent their understandings (e.g., multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).

Unit # - Overview
Content Area: Biology
Unit Title: DNA And Inheritance
Grade Level: 9
Core Ideas: **Unit Summary:** **Students analyze data, develop models to make sense of the relationship between DNA and chromosomes in the process of cellular division, which passes traits from one generation to the next. Students determine why individuals of the same species vary in how they look, function, and behave. Students develop *conceptual models* of the role of DNA in the unity of life on Earth and *use statistical models* to explain the importance of variation within populations for the survival and evolution of species. Ethical issues related to genetic modification of organisms and the nature of science are described. Students explain the mechanisms of genetic inheritance and describe the environmental and genetic causes of gene mutation and the alteration of gene expressions. The crosscutting concepts of *structure and function*, *patterns*, and *cause and effect* are used as organizing concepts for the disciplinary core ideas. Students also use the science and engineering practices to demonstrate understanding of the disciplinary core ideas.**

Unit # - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
HS-LS1-4	**Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.**
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.**
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.**
Science & Engineering Practices	**-Use a model based on evidence to illustrate the relationships between systems or between components of a system.** **-Ask questions that arise from examining models or a theory to clarify relationships.**

	-Make or defend a claim based on evidence about the natural world that reflects scientific knowledge, and student generated evidence.
Disciplinary Core ideas LS1.B	**-Explain how the process of meiosis results in the passage of traits from parent to offspring, and how those results in increased genetic diversity necessary for evolution.**
Disciplinary Core ideas LS1.B	**-In multicellular organism's individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.**
Disciplinary Core Ideas LS3.B	**-Create a visual representation to illustrate how changes in a DNA nucleotide sequence can result in a change in the polypeptide produced.** **-In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur ad result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.**
Disciplinary Core Ideas LS3.B	**Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus, the variations DNA distribution of traits observed depends on both genetic and environmental factors.**
Crosscutting Concepts	**Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.**
Career Readiness, Life Literacies, and Key Skills	
9.1.12.EG.3	Explain how individuals and businesses influence government policies.
9.1.12. FP.3	Relate the concept of delayed gratification (i.e., psychological distance) to meeting financial goals, investing and building wealth over time.
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze and use creative skills and ideas.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills and abilities
9.4.12.IML.8	**Evaluate media sources for point of view, bias, and motivations**
Computer Science and Design Thinking	
8.1.12.IC.1	Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
8.1.12.IC.2	Test and refine computational artifacts to reduce bias and equity deficits.
8.1.12.IC.3	Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.
8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies have had on innovation and on a society's economy, politics, and culture.
8.2.12.ETW.4	Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints.
8.2.12.EC.1	**Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made.**
8.2.12.EC.3	**Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.**
Interdisciplinary Connection	
SL.9-10.4:	"Present information, findings, and supporting evidence clearly, concisely, and logically…"
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
RST.9-10.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

WHST.9-10.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.9-10.6	Use technology, including the Internet, to produce, share, and update writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
Companion Standards ELA/L	
ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of science
ELD-SC.9-12.Explain. Interpretive	Defining investigable questions or problems based on observations, information, and/or data about a phenomenon.
ELD-SC.9-12.Explain.Ex pressive	Develop reasoning to illustrate and/or predict the relationships between variables in a system or between components of a system.
ELD-MA.9-12.Argue. Interpretive	Evaluating relationships among evidence and mathematical principles to create generalizations

Resources/Materials: **Textbook, online resources (The American Biology Teacher, HHMI Publications, Science Times etc.)** www.pearsonsuccessnet.com www.discoverystreaming.com www.tryengineering.org www.teachengineering.org	**Key Vocabulary:** **Punnett Squares** **Probability** **Genes** **Meiosis** **Mitosis** **Mutations** **DNA Replication** **Gene Expression** **Genetic Disorders** **Genetic engineering**

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
How does DNA-replication work?	**Create. and explain a model of DNA-Replication**	Model DNA	2
Green Parakeets	**Solve a genetics problem**	Genetic problems	5
Other Patterns of Inheritance	**Describe other patterns of inheritance and use the laws of probability**	Inheritance and probability	4
Genetic variation	**Defend the claim that genetic variation results from meiosis**	Genetic Variation from meiosis	5 video/cartoon/prezi presentations
Environmental Genetic Mutations	**Defend the claim that genetic variation results from mutations caused by environmental factors/mistakes**	Environmental factors and genetic variation	5

Genetic Engineering	**Create a transgenic organism to solve a real word problem**	Create an organism	2 PBL/Engineering Project
Food Fight	**Create a visual summary of their position concerning GM foods**	GMO foods	4 (PBL)

Teacher Notes:

Additional Resources:

DifferDifferentiation/Modification Strategies

Students with DisaSTbilities	**English Language Learners**	**Gifted and Talented Students**	**Students at Risk**	**504 Students**
Hands on activity - Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase Questions ● - Use project-based science learning to connect science with observable phenomena. ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	**-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking** ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	**-Provide extension activities per student interest -Build on students' intrinsic motivation** ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	**-Hands on Activity - Cooperative Learning -Reteach in various methods -Extended time** ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	**-Hands on Activity - Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations** ● Provide students with multiple choices for how they can represent their understandings (e.g., multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). **504**

Unit # - Overview
Content Area: Biology
Unit Title: Natural Selection and Evolution
Grade Level: 9
Core Ideas: **Unit Summary:** **Students constructing explanations and designing solutions, analyzing and interpreting data, and engaging in argument from evidence investigate to make sense of the relationship between the environment and natural selection. Students also develop an understanding of the factors causing natural selection of species over time. They also demonstrate an understanding of how multiple lines of evidence contribute to the strength of scientific theories of natural selection. The crosscutting concepts of patterns and cause and effect serve as organizing concepts for the disciplinary core ideas. Students also use the science and engineering practices to demonstrate understanding of the disciplinary core ideas.** **Students construct explanations for the processes of natural selection and evolution and then communicate how multiple lines of evidence support these explanations. Students evaluate evidence of the conditions that may result in new species and understand the role of genetic variation in natural selection. Additionally, students can apply concepts of probability to explain trends in population as those trends relate to advantageous heritable traits in a specific environment. Students demonstrate an understanding of these concepts by obtaining, evaluating, and communicating information and constructing explanations and designing solutions. The crosscutting concepts of patterns and cause and effect support the development of a deeper understanding.**

Unit # - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
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 resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.**
HS-LS4-4	**Construct an explanation based on evidence for how natural selection leads to adaptation of populations**
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-LS4-5	**Evaluate the evidence supporting claims that changes in environmental conditions may result in: (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.**
HS-LS2-8	**Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.**
Science & Engineering Practices	**-Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.** **-Evaluate claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments.** **-Evaluate the validity and reliability of multiple claims that appear in scientific and technical tests or media reports, verifying the data when possible.**

Disciplinary Core Ideas LS4.A	**Examine a group of related organisms using a phylogenetic tree or cladogram in order to (1) identify shared characteristics, (2) make inferences about the evolutionary history of the group, and (3) identify character data that could extend or improve the phylogenetic tree.**
Disciplinary Core Ideas LS4.C	**-Make predictions about the effects of natural selection on the genetic makeup of a population over time.** **-Evolution is a consequence of the interaction of four factors:** **1) the potential for a species to increase in number** **2) the genetic variation of individuals in a species due to mutation and sexual reproduction** **3) competition for an environment's limited supply of the resources that individuals need in order to survive and reproduce** **4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment**
Disciplinary Core Ideas LS4.B	**-Natural selection occurs only if there is both (1) variation in the genetic information, between organisms in a population and (2) variation in the expression of that genetic information-that is, trait variation-that leads to differences in performance among individuals.** **-The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population.**
Crosscutting Concepts	**-Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for cause** **-Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.**
Career Readiness, Life Literacies, and Key Skills	
9.4.12.CT.1	**Identify problem-solving strategies used in the development of an innovative product or practice**
9.4.12.CT.2	**Explain the potential benefits of collaborating to enhance critical thinking and problem solving**
9.4.12.GCA.1	**Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others.**
9.4.12.IML.8	**Evaluate media sources for point of view, bias, and motivations.**
9.4.12.IML.9	**Analyze the decisions creators make to reveal explicit and implicit messages within information and media.**
Computer Science and Design Thinking	
8.2.12.EC.3	**Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.**
8.1.12.IC.3	Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.
Cross-cultural Statements/Mandates (Amistad, Holocaust, LGBT, etc...)	
	● **Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)** ● **Develop, implement and model effective problem solving and critical thinking skills (CASEL)** ● **Examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole;** ● **Encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs** **The students will be able to discuss/explore the contribution of members of the LGBTQ+ community and minorities to Science and Society.**
Interdisciplinary Connection	
SL.9-10.4:	"Present information, findings, and supporting evidence clearly, concisely, and logically…"

RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
RST.9-10.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.
WHST.9-10.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.9-10.6	Use technology, including the Internet, to produce, share, and update writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
Companion Standards ELA/L	
NJSLSA.R1.	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
NJSLSA.R2.	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
NJSLSA.R4	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem
WHST.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.
WHST.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Unit Essential Question(s):	**Unit Enduring Understandings:**
● **What is natural selection?** ● **What is Darwin's theory of evolution by natural selection** ● **What are the main lines of scientific evidence that support the theory of evolution?** ● **How can populations evolve to form new species?** ● **How do genes make evolution possible?** ● **What causes a population's gene pool to change?** ● **How do new species form?** **How do evolutionary relationships affect the way scientists classify organisms?**	

Evidence of Learning

Formative Assessments: Quizzes, homework, classwork, tests, Laboratory assignments, PBL's, Engineering Projects;

Summative/Benchmark Assessment(s): Test, PBLs and Engineering Projects

Alternative Assessments: Portfolio (scientific sketches, outlines and essays to show understanding of major concepts, models)

Resources/Materials:	**Key Vocabulary:**
Textbook, online resources (The American Biology Teacher, HHMI Publications, Science Times etc.) www.pearsonsuccessnet.com www.discoverystreaming.com www.tryengineering.org	**Natural Selection** **Common Descent** **Evolution** **DNA classification** **Tree of Life**

www.teachengineering.org	

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
The Alpine Chipmunk's Genetic Decline	**Construct a scientific argument**	What causes genetic decline	4 (PBL)
What is natural selection?	**Simulate natural selection**	How natural selection works	5
Lost Worlds	**Construct an organism and its habitat based on evidence**	Create an organism	4
Evidence of Evolution	**Investigate evidence of evolution**	Evidence of evolution	5
Explore the variations of Honeycreepers	**Solve a mystery**	What is Honeycreepers	3
Evolution of Populations	**Evaluate the evolution of populations**	Evolution of populations	2
Should Antibiotics be restricted?	**Analyze viewpoints and form an opinion based on evidence**	Antibiotic use	2
Epidemic	**Solve a mystery**	Epidemic spread	1
What are cladograms?	**Create cladograms**	Diagram a cladogram	2
Building the Tree of life	**Analyze the tree of life**	Tree of Life Analysis	2
Grin and Bear it	**Solve a mystery**	1	1

Teacher Notes:

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students

Hands on activity - Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, ● - Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	**-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking** ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	**-Provide extension activities per student interest -Build on students' intrinsic motivation** ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	**-Hands on Activity - Cooperative Learning -Reteach in various methods** ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	**-Hands on Activity - Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations** ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).

Unit # - Overview	
Content Area:	
Unit Title:	
Grade Level:	
Core Ideas:	
Unit # - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
Career Readiness, Life Literacies, and Key Skills	
Computer Science and Design Thinking	
Cross-cultural Statements/Mandates (Amistad, Holocaust, LGBT, etc...)	
Interdisciplinary Connection	

Companion Standards ELA/L	

Unit Essential Question(s):	**Unit Enduring Understandings:**

Evidence of Learning

Formative Assessments:
Summative/Benchmark Assessment(s):
Alternative Assessments:

Resources/Materials:	**Key Vocabulary:**

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete

Teacher Notes:

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
Hands on activity - Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions,	-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking	-Provide extension activities per student interest -Build on students' intrinsic motivation	-Hands on Activity - Cooperative Learning -Reteach in various methods -Consult with other teachers -Consult with I&RS	-Hands on Activity - Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations