Biology Curriculum

This curricula and accompanying instructional materials have been developed to align with the NJSLS and in accordance with the NJ Department of Education's guidelines to include: Curriculum designed to meet grade level expectations, integrated accommodations and modifications for students with IEPs, 504s, ELLs, and gifted and talented students, assessments including benchmarks, formative, summative, and alternative assessments, a list of core instructional and supplemental materials, pacing guide, interdisciplinary connections, integration of 21st century skills, integration of technology, and integration of 21st Century Life and Career standards.

About the Standards

In 1996, the New Jersey State Board of Education adopted the state's first set of academic standards called the Core Curriculum Content Standards. The standards described what students should know and be able to do upon completion of a thirteen-year public school education. Over the last twenty years, New Jersey's academic standards have laid the foundation for local district curricula that is used by teachers in their daily lesson plans.

Revised every five years, the standards provide local school districts with clear and specific benchmarks for student achievement in nine content areas. Developed and reviewed by panels of teachers, administrators, parents, students, and representatives from higher education, business, and the community, the standards are influenced by national standards, research-based practice, and student needs. The standards define a "Thorough and Efficient Education" as guaranteed in 1875 by the New Jersey Constitution. Currently the standards are designed to prepare our students for college and careers by emphasizing high-level skills needed for tomorrow's world.

The New Jersey Student Learning Standards include Preschool Teaching and Learning Standards, as well as nine K-12 standards for the following content areas: **21st Century Life and Careers, Comprehensive Health and Physical Education, English Language Arts, Mathematics, Science, Social Studies, Technology, Visual and Performing Arts, World Languages**.

The most recent review and revision of the standards occurred in 2014. However, the standards in language arts and math underwent an additional review in 2015 with adoption by the New Jersey State Board of Education in May 2016.

Lower Cape May Regional School District Biology Curriculum	
Content Area: Biology	
Course Title: Biology	**Grade level: 10**
Unit 1: (Introduction to Biology)	**Pacing: 8 weeks and ongoing throughout the year**
Unit 2: Matter and Energy)	**Pacing: 8 weeks**
Unit 3: (Interdependent Relationships in Ecosystems)	**Pacing: 6 weeks**
Unit 4: (Inheritance and Variation of Traits)	**Pacing: 8 weeks**
Unit 5: (Natural Selection and Evolution)	**Pacing: 6 weeks**
Date Created/Revised: September 2018	**Board Approved On: 12/13/18**

Lower Cape May Regional School District Biology Curriculum Unit 1 Overview
Content Area: Introduction to Biology
Unit Title: Introduction to Biology
Target Course/Grade Level: 10
Unit Summary: ● (The performance expectations in the topic Structure and Function help students formulate an answer to the question: “How do the structures of organisms enable life’s functions?” High school students are able to investigate explanations for the structure and function of cells as the basic units of life, the hierarchical systems of organisms, and the role of specialized cells for maintenance and growth. Students demonstrate understanding of how systems of cells function together to support the life processes. Students demonstrate their understanding through critical reading, using models, and conducting investigations. The crosscutting concepts of structure and function, matter and energy, and systems and system models in organisms are called out as organizing concepts. Topics to be covered: Introduction to biology, basic chemistry review, molecular structure, cellular structure and cell physiology)
Interdisciplinary Connections: **CONNECTIONS TO CCSS (Common core State Standards):** **ELA/LITERARY-** **RST.11-12.1:** Cite specific textual evidence to support analysis of science & technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account (HS-LS1-1). **WHST.9-12.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-1). **WHST.9-12.7:** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS1-3) **WHST.11-12.8:** Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-LS1-3) **WHST.9-12.9:** Draw evidence from informational texts to support analysis, reflection, and research (HS-LS1-1) **SL.11-12.5:** Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest (HS-LS1-2)

CROSSCUTTING CONCEPTS

Patterns **Observed patterns d classification, and they prompt questions about relationships and the factors that influence them** **Cause and Effect: Mechanism and Explanation** **Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.**	**Scale, Proportion, and Quantity** **In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.** **Systems and System Models** **Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.**	**Scale, Proportion, and Quantity** **In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.** **Systems and System Models** **Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.**

SCIENCE & ENGINEERING PRACTICES

Asking Questions and Defining Problems **A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.** **Engineering questions clarify problems to determine criteria for successful solutions and identify constraints to solve problems about the designed world.** **Both scientists and engineers also ask questions to clarify the ideas of others.** **Planning and Carrying Out Investigations** **Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.** **Engineering investigations identify the effectiveness, efficiency, and durability of designs under different conditions.** **Analyzing and Interpreting Data** **Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis.** **Engineering investigations include**	**Developing and Using Models** **A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.** **Modeling tools are used to develop questions, predictions and explanations; analyze and identify flaws in systems; and communicate ideas. Models are used to build and revise scientific explanations and proposed engineered systems. Measurements and observations are used to revise models and designs.** **Constructing Explanations and Designing Solutions** ***The products of science are explanations and the products of engineering are solutions.*** **The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power of phenomena than previous theories.** **The goal of engineering design is to find a systematic solution to problems that is based on scientific knowledge and models of the material world. Each proposed solution results from a process of balancing competing criteria of desired functions, technical feasibility, cost, safety, aesthetics, and compliance with legal requirements. The optimal choice depends on how well the proposed solutions meet criteria and constraints.**	**Using Mathematics and Computational Thinking** **In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships.** **Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of such predictions. Statistical methods are frequently used to identify significant patterns and establish correlational relationships.** **Obtaining, Evaluating, and Communicating Information** **Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity.** **Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations as well as orally, in writing, and through extended discussions.** **Scientists and engineers employ multiple sources to acquire information that is used to evaluate the merit and validity of claims, methods, and designs.**

analysis of data collected in the tests of designs. This allows comparison of different solutions and determines how well each meets specific design criteria—that is, which design best solves the problem within given constraints. Like scientists, engineers require a range of tools to identify patterns within data and interpret the results. Advances in science make analysis of proposed solutions more efficient and effective.	**Engaging in Argument from Evidence** ***Argumentation is the process by which explanations and solutions are reached.*** **In science and engineering, reasoning and argument based on evidence are essential to identifying the best explanation for a natural phenomenon or the best solution to a design problem. Scientists and engineers use argumentation to listen to, compare, and evaluate competing ideas and methods based on merits.** **Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to identify strengths and weaknesses of claims.**	

21st Century Themes, Skills, and Standards:

- (State 21st century themes here). Link http://www.state.nj.us/education/cccs/2014/career/
- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP5. Consider the environmental, social and economic impacts of decisions.
- CRP6. Demonstrate creativity and innovation.
- CRP7. Employ valid and reliable research strategies.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP9. Model integrity, ethical leadership and effective management.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- CRP12. Work productively in teams while using cultural global competence.

- Example: Technology utilization in the form of …………
- 21st Century Life and Career Standard 9.1, including critical thinking, problem solving, creativity, innovation, collaboration, teamwork and leadership, cross-cultural understanding and interpersonal communication and science.

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-LS1-6	**Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.**
PS1.A	**Structure and Properties of Matter**

PS1.B	Chemical Reactions
Unit Enduring Questions: • What is Science? • What are the characteristics of a living thing? • What is the chemical structure of a living thing? • How does structure determine function in a living thing? • What are the major processes that are carried out by cells in a multicellular organism?	**Unit Enduring Understandings:** • Thinking like a scientist using the scientific method to conduct experiments • Investigations into the characteristics of a living thing such as identifying organisms at the salt marsh and then determining what makes them alive. Also, viewing pond water organisms under the microscope and identifying the characteristics that allow scientists to classify them as being alive • Applying knowledge of biomolecules to construct models of carbohydrates, lipids and proteins and then joining them together through the process of dehydration synthesis • Viewing cells under the microscope and being able to recognize important cell organelles that perform specialized functions that allow the cell to work together with other cells to perform essential life functions • Understanding the processes of photosynthesis, respiration, protein synthesis and transport by completing laboratory investigations pertaining to these topics
Unit Objectives: ***Students will know….*** • that scientists use the scientific method to test a hypothesis • that biomolecules are the chemical compounds that make up all living things • how the structures of organisms enable life's functions • how systems of cells function together to support the life processes • how specialization of cells allows for division of labor	**Unit Objectives:** ***Students will be able to……*** • perform experiments that follow the scientific method to attempt to solve a problem and arrive at a valid conclusion • understand and demonstrate the structure of basic biochemical compounds that are essential to all life • demonstrate explanations for the structure and function of cells as the basic units of life • investigate the hierarchical systems of organisms • investigate the role of specialized cells for maintenance and growth

Lower Cape May Regional School District Biology Curriculum Unit 2 Overview
Content Area: Biology
Unit Title: Matter and Energy in Organisms and Ecosystems
Target Course/Grade Level: 10th grade

Unit Summary:

- **<u>Unit 2 Matter and Energy in Organisms and Ecosystems:</u>**The performance expectations in the topic Matter and Energy in Organisms and Ecosystems help students answer the questions: "How do organisms obtain and use energy they need to live and grow? How do matter and energy move through ecosystems?" High school students can construct explanations for the role of energy in the cycling of matter in organisms and ecosystems. They can apply mathematical concepts to develop evidence to support explanations of the interactions of photosynthesis and cellular respiration and develop models to communicate these explanations. They can relate the nature of science to how explanations may change in light of new evidence and the implications for our understanding of the tentative nature of science. Students understand organisms' interactions with each other and their physical environment, how organisms obtain resources, change the environment, and how these changes affect both organisms and ecosystems. In addition, students can utilize the crosscutting concepts of matter and energy and Systems and system models to make sense of ecosystem dynamics.

Interdisciplinary Connections:

CONNECTIONS TO CCSS

Common Core State Standards Connections:
ELA/Literacy

RST.11-12.1	**Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-6), (HS-LS2-3)**
WHST.9-12.2	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. (HS-LS1-6), (HS-LS2-3)**

WHST.9-12.5	**Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-LS1-6), (HS-LS2-3**
WHST.9-12.9	**Draw evidence from informational tests to support analysis, reflection, and research. (HS-LS1-6)**
SL.11-12.5	**Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-LS1-5), (HS-LS1-7) enhance understanding of findings, reasoning, and evidence and to add interest. (HS-LS1-5), (HS-LS1-7)**

Crosscutting Concepts

Patterns: Observed patterns d classification, and they prompt questions about relationships and the factors that influence them

Cause and Effect: Mechanism and Explanation
Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.

Scale, Proportion, and Quantity:
In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

Systems and System Models
Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.

Energy and Matter: Flows, Cycles, and Conservation
Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

Structure and Function
The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.

Stability and Change
For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

SCIENCE & ENGINEERING PRACTICES

Asking Questions and Defining Problems

A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.
Engineering questions clarify problems to determine criteria for successful solutions and identify constraints to solve problems about the designed world.
Both scientists and engineers also ask questions to clarify the ideas of others.

Planning and Carrying Out Investigations

Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.
Engineering investigations identify the effectiveness, efficiency, and durability of designs under different conditions.

Analyzing and Interpreting Data

Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical

analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis.

Engineering investigations include analysis of data collected in the tests of designs. This allows comparison of different solutions and determines how well each meets specific design criteria—that is, which design best solves the problem within given constraints. Like scientists, engineers require a range of tools to identify patterns within data and interpret the results. Advances in science make analysis of proposed solutions more efficient and effective.

Developing and Using Models
A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.
Modeling tools are used to develop questions, predictions and explanations; analyze and identify flaws in systems; and communicate ideas. Models are used to build and revise scientific explanations and proposed engineered systems. Measurements and observations are used to revise models and designs.

Constructing Explanations and Designing Solutions
The products of science are explanations and the products of engineering are solutions.
The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power of phenomena than previous theories.
The goal of engineering design is to find a systematic solution to problems that is based on scientific knowledge and models of the material world. Each proposed solution results from a process of balancing competing criteria of desired functions, technical feasibility, cost, safety, aesthetics, and compliance with legal requirements. The optimal choice depends on how well the proposed solutions meet criteria and constraints.

Engaging in Argument from Evidence
Argumentation is the process by which explanations and solutions are reached.
In science and engineering, reasoning and argument based on evidence are essential to identifying the best explanation for a natural phenomenon or the best solution to a design problem. Scientists and engineers use argumentation to listen to, compare, and evaluate competing ideas and methods based on merits.
Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to identify strengths and weaknesses of claims.

Using Mathematics and Computational Thinking
In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships.
Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of such predictions. Statistical methods are frequently used to identify significant patterns and establish correlational relationships.

Obtaining, Evaluating, and Communicating Information
Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity.
Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations as well as orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to acquire information that is used to evaluate the merit and validity of claims, methods, and designs.

21st Century Themes, Skills, and Standards:

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP5. Consider the environmental, social and economic impacts of decisions.

- CRP6. Demonstrate creativity and innovation.
- CRP7. Employ valid and reliable research strategies.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP9. Model integrity, ethical leadership and effective management.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- CRP12. Work productively in teams while using cultural global competence

ASSOCIATED STANDARDS

HS-LS2-5	**Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.**
HS-LS2-7	**Use a model to illustrate that cellular 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.**
HS-LS2-3	**Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.** **Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.**
HS-LS2-5	**Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.**

Unit Enduring Questions:

- **How do organisms obtain and use energy they need to live and grow?**
- **How do plants convert light, water and carbon dioxide into glucose and oxygen?**
- **How are organisms dependent on each other?**
- **What is the relationship between the processes of photosynthesis and respiration?**
- **How do carbon dioxide, water and nitrogen cycle through the biosphere?**

Unit Enduring Understandings:

- **Understanding that photosynthesis converts light energy into chemical energy by conducting experiments that demonstrate the functions of various plant structures, specifically, leaves and their pigments, the stomata, roots, stems and the process of capillary action**
- **Understanding that plants need light, water and carbon dioxide in order to produce glucose sugar as the basic fuel source for all living cells and understanding that oxygen is a waste product by conducting an experiment that reinforces this concept**
- **Understanding the concept of a food chain and being able to navigate a food web**

Unit Objectives:
Students will know….

- **that the process of photosynthesis converts light energy to stored energy by converting carbon dioxide and water into glucose and oxygen**

- **that cellular respiration is a process in which organisms break down sugars into glucose, the basic fuel source for living things and produce carbon dioxide as a waste product**

- **that water cycles through the biosphere and is an essential chemical compound for all living things**

- **that carbon cycles through the biosphere and is an essential chemical compound for all living things**

- **that the nitrogen cycle is an important chemical cycle that affects the success of all living things**

- **Students will understand that respiration uses the products of photosynthesis (glucose and oxygen) to produce carbon dioxide, water and energy in the form of ATP by completing a respiration lab**

- **Students should be able to interpret models of the carbon cycle, water cycle and nitrogen cycle in order to understand how these life dependent compounds cycle among organisms in the biosphere**

Unit Objectives:
Students will be able to…...

- **conduct a lab that demonstrates the release of oxygen as a waste product from an Elodea plant as it absorbs carbon dioxide and water under the presence of light**
- **conduct experiments using yeast cells as the organism that undergoes cellular respiration releasing carbon dioxide as a waste product**
- **navigate a diagram of a water cycle and explain each of the processes that make it up**
- **navigate a diagram of the carbon cycle and be able to understand each of the processes that compose the carbon cycle such as photosynthesis and respiration, decomposition and the influence of human activity on the biosphere**
- **navigate a diagram of the nitrogen cycle and be able to explain how the success of our aquarium tanks is dependent on the nitrogen cycle**

Lower Cape May Regional School District Biology Curriculum Unit 3 Overview	
Content Area: Biology	
Unit Title: Interdependent Relationships in Ecosystems	
Target Course/Grade Level: 10	
Unit Summary: The performance expectations in the topic Interdependent Relationships in Ecosystems help students answer the question, "How do organisms interact with the living and non-living environment to obtain matter and energy?" This topic builds on the other topics as high school students demonstrate an ability to investigate the role of biodiversity in ecosystems and the role of animal behavior on survival of individuals and species. Students have increased understanding of interactions among organisms and how those interactions influence the dynamics of ecosystems. Students can generate mathematical comparisons, conduct investigations, use models, and apply scientific reasoning to link evidence to explanations about interactions and changes within ecosystems.	
Common Core State Standards Connections: **ELA/Literacy -**	
RST.11-12.1	**Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-1)**
WHST.9-12.2	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-1)**
WHST.9-12.7	**Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS1-3)**
WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-LS1-3)
HS-LS2-2	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

HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity
HS-LS2-8	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce
HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity

Unit Enduring Questions:

- **How are organisms dependent on each other?**
- **How do humans impact the cycling of matter and the flow of energy in a system?**
- **How do organisms interact with the biotic and abiotic factors to obtain matter and energy?**

Unit Enduring Understandings:

- **Photosynthesis converts light energy into chemical energy, specifically glucose sugar which is the basic fuel source for all cells**
- **Human activities have an impact on the cycling of matter and the flow of energy within the biosphere**
- **The success of organisms is dependent on the relationships between organisms and the biotic and abiotic factors in an ecosystem**

Unit Objectives:
Students will know….

- **that organisms affect one another's survival**
- **that organisms are divided into levels of organization which makes it easier for scientists to study and understand them**
- **that biotic and abiotic factors influence an ecosystem**
- **that community interactions, such as competition, predation, and various forms of symbiosis can powerfully affect an ecosystem**
- **that the appearance of stability of an ecosystem is often misleading because ecosystems and communities are always changing**
- **that the size of a population is constantly changing and is affected by immigration, emigration and limiting factors**
- **that human activities can have an effect on the biosphere**

Unit Objectives:
Students will be able to…...

- **make a food web that shows how organisms interact with one another**
- **list the taxons in order from the most general to the most specific and be able to list characteristics of each and be able to give examples of organisms at each level of the hierarchy**
- **identify the difference between biotic and abiotic factors and how they affect the survival of an organism**
- **demonstrate the different types of relationships that exist between organisms**
- **understand the difference between primary and secondary succession by giving examples of each**
- **explain the factors that affect the size of a populations**
- **identify the human factors that have an effect on the biosphere such as global warming, pollution, ozone depletion, acid rain, hunting, and deforestation**

Lower Cape May Regional School District Biology Curriculum
Unit 4 Overview

Content Area: Biology

Unit Title: Inheritance and Variation of Traits

Target Course/Grade Level: 10

Unit Summary:

- Unit 4 Inheritance and Variation of Traits:The performance expectations in the topic Inheritance and Variation of Traits help students in pursuing an answer to the question: “How are the characteristics from one generation related to the previous generation?” High school students demonstrate understanding of the relationship of DNA and chromosomes in the processes of cellular division that pass traits from one generation to the next. Students can determine why individuals of the same species vary in how they look, function, and behave. Students can develop conceptual models for 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 can be described. Students can explain the mechanisms of genetic inheritance and describe the environmental and genetic causes of gene mutation and the alteration of gene expression. Crosscutting concepts of structure and function, patterns, and cause and effect developed in this topic help students to generalize understanding of inheritance of traits to other applications in science

Interdisciplinary Connections:

- **CONNECTIONS TO CCSS:**

RST.11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS3-1),(HS-LS3-2)
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. (HS-LS3-1)
WHST.9-12.1	Write arguments focused on discipline-specific content. (HS-LS3-2)

DISCIPLINARY CORE IDEAS

Crosscutting Concepts		
Patterns **Observed patterns d classification, and they prompt questions about relationships and the factors that influence them** **Cause and Effect: Mechanism and Explanation** **Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.**	**Scale, Proportion, and Quantity** **In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.** **Systems and System Models** **Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.**	**Energy and Matter: Flows, Cycles, and Conservation** **Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.** **Structure and Function** **The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.** **Stability and Change** **For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.**

SCIENCE & ENGINEERING PRACTICES

Asking Questions and Defining Problems **A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.** **Engineering questions clarify problems to determine criteria for successful solutions and identify constraints to solve problems about the designed world.** **Both scientists and engineers also ask questions to clarify the ideas of others.** **Planning and Carrying Out Investigations** **Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.** **Engineering investigations identify the effectiveness, efficiency, and durability of designs under different conditions.** **Analyzing and Interpreting Data** **Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not**	**Developing and Using Models** **A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.** **Modeling tools are used to develop questions, predictions and explanations; analyze and identify flaws in systems; and communicate ideas. Models are used to build and revise scientific explanations and proposed engineered systems. Measurements and observations are used to revise models and designs.** **Constructing Explanations and Designing Solutions** ***The products of science are explanations and the products of engineering are solutions.*** **The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power of phenomena than previous theories.** **The goal of engineering design is to find a systematic solution to problems that is based on scientific knowledge and models of the material world. Each proposed solution results from a process of balancing competing criteria of desired functions, technical feasibility, cost, safety, aesthetics, and compliance with legal**	**Using Mathematics and Computational Thinking** **In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships.** **Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of such predictions. Statistical methods are frequently used to identify significant patterns and establish correlational relationships.** **Obtaining, Evaluating, and Communicating Information** **Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity.** **Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations as well as orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to acquire information that is used to evaluate the merit and validity of claims, methods, and designs.**

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21st Century Themes, Skills, and Standards:

- CRP1. Act as a responsible and contributing citizen and employee.
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- CRP11. Use technology to enhance productivity.
- CRP12. Work productively in teams while using cultural global competence.

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
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.**
HS-LS3-3	**Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.**

Unit Enduring Questions

- **How do DNA and RNA participate in the process of making proteins?**
- **How is the genetic code preserved and passed on from generation to generation?**
- **How does the cell cycle regulate normal and abnormal cell growth?**
- **What causes variations in individuals within a given population?**
- **How are traits passed from one generation to another?**

Unit Enduring Understandings:

- **All cells contain DNA which contains units called genes which codes for proteins**
- **Groups of specialized cells use proteins to carry out functions that are essential to the organism**
- **Cells have the ability to divide and differentiate and are regulated by the cell cycle**
- **Investigating patterns of inheritance that allow us to predict the outcome of genetic crosses between various individuals**
- **Variations in genetic material naturally result during meiosis when corresponding sections of chromosome pairs exchange places**

Unit Objectives:
Students will know….

Unit Objectives:
Students will be able to…...

• **that DNA is the nucleic acid that stores and transmits the genetic information from one generation of an organism to the next** • **that the structure of the DNA molecule is that of a double helix with alternating sugars and phosphates along the sides and nitrogen bases making up the rungs** • **that DNA is able to make an exact copy of itself through the process of replication so that precise genetic information can be passed on from one generation of cells to the next** • **cells undergo the cell cycle and in the process divide into two daughter cells, each of which then begins the cell cycle again** • **that mitosis ensures that each daughter cell has the same genetic information as the parent cell** • **the principles of probability can be used to predict the outcomes of genetic crosses** • **Punnett squares can be used to predict the results of a genetic cross** • **Humans can manipulate DNA to increase variation in offspring**	• **explain the process of protein synthesis beginning with transcription and ending with translation** • **demonstrate the structure of the DNA molecule by using a kit to build nucleotides and then assembling them into the structure of the DNA molecule** • **demonstrate the process of replication by constructing a model of DNA and then following the steps to replication** • **explain the cell cycle using a diagram to show the different stages** • **name, draw and describe each of the step of mitosis** • **find the ratio of the genotypes and phenotypes of a genetic cross by using Punnett Squares to predict the outcome of a genetic cross** • **demonstrate various methods of human manipulation of genes in order to better understand how various genetic diseases occur and to possibly find a cure**

Lower Cape May Regional School District Biology Curriculum **Unit 5 Overview**
Content Area: Biology
Unit Title: Natural Selection and Variation
Target Course/Grade Level: 10
Unit Summary: ● **Unit 5 Natural Selection and Evolution**:The performance expectations in the topic Natural Selection and Evolution help students answer the questions: "How can there be so many similarities among organisms yet so many different plants, animals, and microorganisms? How does biodiversity affect humans?" High school students can investigate patterns to find the relationship between the environment and natural selection. Students demonstrate understanding of the factors causing natural selection and the process of evolution of species over time. They demonstrate understanding of how multiple lines of evidence contribute to the strength of scientific theories of natural selection and evolution. Students can demonstrate an understanding of the processes that change the distribution of traits in a population over time and describe extensive scientific evidence ranging from the fossil record to genetic relationships among species that support the theory of biological evolution. Students can use models, apply statistics, analyze data, and produce scientific communications about evolution. Understanding of the crosscutting concepts of patterns, scale, structure and function, and cause and effect supports the development of a deeper understanding of this topic

Interdisciplinary Connections:

CONNECTIONS TO CCSS (*Common Core State Standards Connections);*

ELA/Literacy-

RST.11-12.1: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-1)

WHST.9-12.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-1)

WHST.9-12.7: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS1-3)

WHST.11-12.8: Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-LS1-3)

WHST.9-12.9: Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS1-1)

SL.11-12.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-LS1-2)

Crosscutting Concepts		
Patterns Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. **Cause and Effect: Mechanism and Explanation** Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts	**Scale, Proportion, and Quantity** In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance. **Systems and System Models** Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.	**Energy and Matter: Flows, Cycles, and Conservation** Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations. **Structure and Function** The way in which an object or living thing is shaped and its substructure determine many of its properties and functions. **Stability and Change** For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

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ASSOCIATED STANDARDS
Students who demonstrate understanding can:

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-LS4-5
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.

Unit Enduring Questions:	**Unit Enduring Understandings:**
• **What is the evidence that suggests that evolution has occurred?** • **How do evolution and natural selection explain the diversity of species found on Earth?** • **How does genetic variation lead to changes in a population over time and the diversity of a species?**	• **Evidence for evolution can be found in comparisons of DNA sequences, the fossil record, anatomical and embryological evidence** • **Competition for limited resources causes individuals with traits that give a competitive advantage to be able to survive and reproduce at higher rates** • **Genes for traits with competitive advantage will be passed on in greater proportions to the next generation. Over many generations, groups with these traits can evolve into a different**

	species ● **Natural selection causes adaptations that lead to changes in the distribution of traits within a population as conditions change** ● **Changes in the environment. either natural or human induced lead to changes in species such as growth, decline, emergence of new species or extinction**

Unit Objectives: ***Students will know…*** ● **that geologic distribution of organisms, fossils and evidence of a common ancestor all suggest that evolution has occurred** ● **that both Charles Darwin and Jean - Baptiste Lammarck proposed theories that attempted to support the idea that evolution has occurred** ● **that biological diversity, homologous structures, similarities in embryos and similarities in chemical makeup support the idea of a common ancestor** ● **that genetic variation is due to mutations and genetic shuffling during meiosis** ● **that all organisms are classified into groups according to Linnaeus' system of classification**	**Unit Objectives:** Students will be able to ……… ● **analyze evidence of evolution to show connections between related species** ● **investigate how variations within a species can lead to natural selection and speciation based on advantageous traits** ● **understand why Darwin's theory is the theory that is accepted today and understand why Lamarck's theory is not** ● **dissect a chicken wing for proof that homologous structures occur between humans and birds** ● **explain how organisms of the same species and of the same family are different** ● **list the taxons in order from the most general to the most specific according to Linnaeus' system of classification**

Lower Cape May Regional School District Biology Curriculum **Evidence of Learning**
Specific Formative Assessments Utilized in Daily Lessons: ● Question and answer, exit ticket, 3-2-1 Activity, Quizlet, Kahoot
Summative Assessment Utilized throughout Units: ● Quizzes, lab reports, tests ● Students should understand scientific practices and be able to generate scientific evidence through laboratory investigations ● Students should be able to recognize the relationships between matter and energy and the organization of living things ● Students should understand the organization of a living thing and that the cell is the basic unit of structure and function and that specialized cells perform specialized functions ● Students should understand the processes carried out by cells including cell reproduction and genetics ● Students should understand the processes of evolution and biodiversity and that they are ongoing processes in a constantly changing environment ● Students should understand how organisms interact within their environment ● Students will participate in classroom activities that include problem solving and group work ● Students will complete formal written laboratory reports
Modifications for ELL's, Special Education, 504, and Gifted and Talented Students: ● Teacher tutoring ● Peer tutoring ● Cooperative Learning Groups ● Modified Assignments ● Differentiated Instruction ● Response to Intervention (www.help4teachers.com) ● Follow all IEP and 504 modifications **Modify assignments to ability level (Homework, Tests, etc)** ● **Priority / Preferential Seating/ work with Peer** ● **Provide Individual Assistance/ Direct Instruction** ● **Provide Frequent Encouragement/ Positive Reinforcement** ● **Use computer, calculator, audio materials where necessary** ● **Extended time for tests, assignments, experienced** ● **Read tests, directions, information aloud- if needed, test in small groups** ● **Provide study guides, copies of notes, and content information** ● **Read written information aloud** ● **Pair written directions with oral directions** ● **Provide word banks, graphic organizers, use of organizational materials**
Project-based Learning Tasks: ● set up and maintain aquarium tanks ● Characteristics of Living Things activity ● Pond Water Lab ● Properties of Mixtures Lab

- Acid Base Lab
- Chemistry of Biomolecules Labs
- Enzyme Lab
- Cell Lab
- 3-d model of the cell lab
- Gummy Bear Lab
- Osmosis and Diffusion Lab
- Plasmolysis Lab
- Potato Slice activity
- Photosynthesis Lab
- Stomata Lab
- Fermentation Lab
- Molecular Model of DNA Lab
- DNA Extraction Lab
- Mitosis Lab
- Video: Cracking Your Genetic Code
- Mating Traits Lab
- Genetic Cross Problems
- Genetics of Blood lab
- Dissection of a Chicken Wing Lab
- Protist Lab
- DVD: What Darwin Never Knew
- Invertebrate Lab
- Virtual Frog Dissection
- Frog Dissection

Vocabulary:

- In-text vocabulary should be incorporated into every unit. Word journals, vocabulary walls, and/or various other activities should be utilized by the instructor to teach vocabulary.

The Research Process:

- The research process must be integrated within each course curriculum. Student will be provided with opportunities to investigate issues from thematic units of study. As the NJSLS indicate, students will develop proficiency with MLA or APA format as applicable.
- Internet, Library

Technology:

- Students must engage in technology applications integrated throughout the curriculum.
- Microscopes, Computer: Microscope Office, Internet

Resources:

- Power Point,
- Lab materials
- aquarium tanks and accessories

Differentiation Strategies

Differentiation strategies can require varied amounts of preparation time. High-prep strategies often require a teacher to both create multiple pathways to process information/demonstrate learning and to assign students to those pathways. Hence, more ongoing monitoring and assessment is often required. In contrast, low-prep strategies might require a teacher to strategically create process and product choices for students, but students are allowed to choose which option to pursue given their learning profile or readiness level. Also, a low-prep strategy might be focused on a discrete skill (such as vocabulary words), so there are fewer details to consider. Most teachers find that integration of one to two new low-prep strategies and one high-prep strategy each quarter is a reasonable goal.

Low Prep Strategies (add to list as needed)	
Varied journal prompts, spelling or vocabulary lists	Students are given a choice of different journal prompts, spelling lists or vocabulary lists depending on level of proficiency/assessment results.
Anchor activities	Anchor activities provide meaningful options for students when they are not actively engaged in classroom activities (e.g., when they finish early, are waiting for further directions, are stumped, first enter class, or when the teacher is working with other students). Anchors should be directly related to the current learning goals.
Choices of books	Different textbooks or novels (often at different levels) that students are allowed to choose from for content study or for literature circles.
Choices of review activities	Different review or extension activities are made available to students during a specific section of the class (such as at the beginning or end of the period).
Homework options	Students are provided with choices about the assignments they complete as homework. Or, students are directed to specific homework based on student needs.
Student-teacher goal setting	The teacher and student work together to develop individual learning goals for the student.
Flexible grouping	Students might be instructed as a whole group, in small groups of various permutations (homogeneous or heterogeneous by skill or interest), in pairs or individual. Any small groups or pairs change over time based on assessment data.
Varied computer programs	The computer is used as an additional center in the classroom, and students are directed to specific websites or software that allows them to work on skills at their level.
Multiple Intelligence or Learning Style options	Students select activities or are assigned an activity that is designed for learning a specific area of content through their strong intelligence (verbal-linguistic, interpersonal, musical, etc.)
Varying scaffolding of same organizer	Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.
Think-Pair-Share by readiness, interest, and/or learning profile	Students are placed in predetermined pairs, asked to think about a question for a specific amount of time, then are asked to share their answers first with their partner and then with the whole group.

Mini workshops to re-teach or extend skills	A short, specific lesson with a student or group of students that focuses on one area of interest or reinforcement of a specific skill.
Orbitals	Students conduct independent investigations generally lasting 3-6 weeks. The investigations “orbit” or revolve around some facet of the curriculum.
Games to practice mastery of information and skill	Use games as a way to review and reinforce concepts. Include questions and tasks that are on a variety of cognitive levels.
Multiple levels of questions	Teachers vary the sorts of questions posed to different students based on their ability to handle them. Varying questions is an excellent way to build the confidence (and motivation) of students who are reluctant to contribute to class discourse. Note: Most teachers would probably admit that without even thinking about it they tend to address particular types of questions to particular students. In some cases, such tendencies may need to be corrected. (For example, a teacher may be unknowingly addressing all of the more challenging questions to one student, thereby inhibiting other students’ learning and fostering class resentment of that student.)
High Prep Strategies (add to list as needed)	
Cubing	Designed to help students think about a topic or idea from many different angles or perspectives. The tasks are placed on the six sides of a cube and use commands that help support thinking (justify, describe, evaluate, connect, etc.). The students complete the task on the side that ends face up, either independently or in homogenous groups.
Tiered assignment/ product	The content and objective are the same, but the process and/or the products that students must create to demonstrate mastery are varied according to the students’ readiness level.
Independent studies	Students choose a topic of interest that they are curious about and wants to discover new information on. Research is done from questions developed by the student and/or teacher. The researcher produces a product to share learning with classmates.
4MAT	Teachers plan instruction for each of four learning preferences over the course of several days on a given topic. Some lessons focus on mastery, some on understanding, some on personal involvement, and some on synthesis. Each learner has a chance to approach the topic through preferred modes and to strengthen weaker areas
Jigsaw	Students are grouped based on their reading proficiency and each group is given an appropriate text on a specific aspect of a topic (the economic, political and social impact of the Civil War, for example). Students later get into heterogeneous groups to share their findings with their peers, who have read about different areas of study from source texts on their own reading levels. The jigsaw technique allows you to tackle the same subject with all of your students while discreetly providing them the different tools they need to get there.

Multiple texts	The teacher obtains or creates a variety of texts at different reading levels to assign strategically to students.
Alternative assessments	After completing a learning experience via the same content or process, the student may have a choice of products to show what has been learned. This differentiation creates possibilities for students who excel in different modalities over others (verbal versus visual).
Modified Assessments	Assessments can be modified in a variety of ways – for example by formatting the document differently (e.g. more space between questions) or by using different types of questions (matching vs. open ended) or by asking only the truly essential questions.
Learning contracts or Personal Agendas	A contract is a negotiated agreement between teacher and student that may have a mix of requirements and choice based on skills and understandings considered important by the teacher. A personal agenda could be quite similar, as it would list the tasks the teacher wants each student to accomplish in a given day/lesson/unit. Both Learning contracts and personal agendas will likely vary between students within a classroom.
Compacting	This strategy begins with a student assessment to determine level of knowledge or skill already attained (i.e. pretest). Students who demonstrate proficiency before the unit even begins are given the opportunity to work at a higher level (either independently or in a group).
Literature circles	Flexible grouping of students who engage in different studies of a piece of literature. Groups can be heterogeneous and homogeneous.
Learning Centers	A station (or simply a collection of materials) that students might use independently to explore topics or practice skills. Centers allow individual or groups of students to work at their own pace. Students are constantly reassessed to determine which centers are appropriate for students at a particular time, and to plan activities at those centers to build the most pressing skills.
Tic-Tac-Toe Choice Board (sometimes called "Think-Tac-Toe"	The tic-tac-toe choice board is a strategy that enables students to choose multiple tasks to practice a skill, or demonstrate and extend understanding of a process or concept. From the board, students choose (or teacher assigns) three adjacent or diagonal. To design a tic-tac-toe board: - Identify the outcomes and instructional focus - Design 9 different tasks - Use assessment data to determine student levels - Arrange the tasks on a tic-tac-toe board either randomly, in rows according to level of difficulty, or you may want to select one critical task to place in the center of the board for all students to complete.

Curriculum development Resources/Instructional Materials:
List or Link Ancillary Resources and Curriculum Materials Here: ● Biology textbook ● Labs and lab materials ● DVDs ● Internet

Board of Education Approved Text(s)
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