

# **COURSE OF STUDY GUIDE**

## **CAPE MAY REGIONAL SCHOOL DISTRICT**

**TITLE OF COURSE: LIFE SCIENCE**

**DEPARTMENT: SCIENCE**

**GRADE: 7**

**DATE REVISED: JULY 2016**

*Lori Schulte, Heather Shagren, Shelley Vogelei*

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### **I. COURSE ORGANIZATION**

Length: ONE YEAR

Credits:N/A

Periods per Week: Two-80 min Blocks, One-42 min class

Weighted: N/A

Prerequisite: N/A

### **II. COURSE DESCRIPTION**

**7<sup>th</sup> Grade Life Science at RMT encompasses Life Science. This year long course is aligned with Next Generation Standards and prepares students to take the required state assessment in Science. The design of this course includes Skills of a Scientist, Careers, Measurement, Technology, NJ Flora and Fauna, Living Things and their Characteristics, Spontaneous Generation/Biogenesis, Microscopes, Cell Theory, Animal and Plant Cells, Cell Processes, Human Body, Genetics, Classification and Ecology.**

### **III. COURSE MISSION**

**Life Science will provide RM Teitelman Scientists with the skills and content to make informed decisions regarding the natural world around them and careers directly related to this field.**

### **IV. DEPARTMENT MISSION**

**The mission statement for RM Teitelman Science is to endow all learners with the power and potential of science in their lives. It is a lifelong journey where science plays an important role in their everyday connection with Biology.**

## **VI. COURSE LEVEL ASSESSMENTS & BENCHMARKS**

**BENCHMARK 1:** 7<sup>th</sup> Grade Scientists will analyze and demonstrate the skills necessary in science; qualitative and quantitative observations, graphing, hypothesizing, and analyzing biological facts vs. myths.

**BENCHMARK 2:** 7<sup>th</sup> Grade Scientists will use Metric scientific tools to accurately measure objects with appropriate units.

**BENCHMARK 3:** 7<sup>th</sup> Grade Scientists will identify the six characteristics that all living things possess.

**BENCHMARK 4:** 7<sup>th</sup> Grade Scientists will explain the seven levels of Classification and the unique features of kingdoms.

**BENCHMARK 5:** 7<sup>th</sup> Grade Scientists will classify the five classes of vertebrate animals.

**BENCHMARK 6:** 7<sup>th</sup> Grade Scientists will accurately use a Microscope to magnify objects.

**BENCHMARK 7:** 7<sup>th</sup> Grade Scientists will compare and contrast animal and plant cell organelles.

**BENCHMARK 8:** 7<sup>th</sup> Grade Scientists will analyze cell processes and energy.

**BENCHMARK 9:** 7<sup>th</sup> Grade Scientists will account for the differences in dominant and recessive traits

**BENCHMARK 10:** 7<sup>th</sup> Grade Scientists will accurately use Punnett Squares for Probability.

**BENCHMARK 11:** 7<sup>th</sup> Grade Scientists will identify the structures of DNA.

**BENCHMARK 12:** 7<sup>th</sup> Grade Scientists will describe characteristics of the 5 Kingdoms of Life

**BENCHMARK 13:** 7<sup>th</sup> Grade Scientists will classify the levels of Organization in living things.

**BENCHMARK 14:** 7<sup>th</sup> Grade Scientists will organize Human Body Systems structures and functions.

**BENCHMARK 15:** 7<sup>th</sup> Grade Scientists will categorize food chains and webs in ecosystems.

**BENCHMARK 16:** 7<sup>th</sup> Grade Scientists will analyze features of the Earth's 6 Biomes

**VII. ASSESSMENT TASKS**

*Written*

ChromeBook Web Sites  
 Lab Conclusion Questions  
 Tests & Quizzes  
 Benchmarks  
 Science World Magazine  
 Science Poetry  
 Magazine/Newspaper Articles Analysis  
 Lab Experiments

*Oral*

Exit Questions  
 Lab Procedures  
 Project Presentations  
 Lab Experiments

*Visual*

ChromeBook Web Sites  
 Bill Nye/Eyewitness Videos  
 Smart Board/Mimeo Board  
 Science World Magazine  
 Magazine/Newspaper Articles  
 Science Field Trips  
 Magazine/Newspaper Articles Analysis  
 Lab Experiments

**VIII. CONTENT/SUGGESTED INSTRUCTIONAL TIME**

**Content Pacing Guide & Standards**

<b>Unit Title: Introduction to Life Science</b>		
<p><b>Content: <i>What is Life Science?</i></b>          Identify skills scientists use to learn about the world. Explain what Scientific Inquiry involves. Describe how to develop a hypothesis. Examine how to make observations and inferences. Practice reading and using Scientific tools properly. Practice safe lab procedures. Measure accurately using science tools. Explain how Technology is used by a scientist.</p> <p><b>Labs:</b>  <i>Lab Safety Contract, Safety Map, Safety Rules, Save Fred Inquiry Lab, Observation Labs, Penny Lab, M&amp;M Graphing Lab, Observainers Hypothesis Lab, Metric Measurement Labs, Monarch Rearing Lab, Bird, Tree, and Bat Lab Experiences, Chromebook Introduction and Excel Graphing, Tool Time Labs, Skills of A Scientist-Next Generation Manual, Qualitative and Quantitative Observations</i></p> <p><b><u>Common Core State Standards:</u></b>          CC6-8WH/SS/S/TS7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.          CCSS.ELA-Literacy.WHST.6-8.9 - Draw evidence from informational texts to</p>	<p><b><u>21<sup>st</sup> Century</u></b>          9.1.12.A.1          CRITICAL THINKING          9.3.4 A.1          GROUP WORK          9.1.4.C.1</p> <p><b><u>NGSS</u></b>  <u>MS-LS1 From Molecules to Organisms: Structure and Processes</u>  <u>MS-LS2 Ecosystems: Interactions, Energy, and Dynamics</u>  <u>MS-LS3 Heredity: Inheritance and Variation of Traits</u>  <u>MS-LS4 Biological Evolution: Unity and</u></p>	<p>Time Frame          6 Weeks/Year Long application</p>

<p>support analysis reflection, and research.</p> <p>CC.5.W.7 Research to Build and Present Knowledge: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>CC.5.R.I.7 Integration of Knowledge and Ideas: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p>	<p><u>Diversity</u></p> <p><u>ETSI: Engineering Design</u></p> <p><u>ETS1.B: Developing Possible Solutions</u></p>	
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Physical Science	Life Science	Earth & Space Science	Engineering, Technology, & The Application of Science
<p><input type="checkbox"/> <b>PS1: Matter &amp; Its Interactions</b></p> <p>___ PS1.A: Structure and Properties of Matter</p> <p>___ PS1.B: Chemical Reactions</p> <p>___ PS1.C: Nuclear Processes</p> <p><input type="checkbox"/> <b>PS2: Motion and Stability: Forces &amp; Interactions</b></p> <p>___ PS2.A: Forces and Motion</p> <p>___ PS2.B: Types of Interactions</p> <p>___ PS2.C: Stability and Instability in Physical Systems</p> <p><input type="checkbox"/> <b>PS3: Energy</b></p> <p>___ PS3.A: Definitions of Energy</p> <p>___ PS3.B: Conservation of Energy &amp; Energy Transfer</p> <p>___ PS3.C: Relationship Between Energy and Forces</p> <p>___ PS3.D: Energy in Chemical Processes and Everyday Life</p> <p><input type="checkbox"/> <b>PS4: Waves &amp; Their Applications in Technologies for Information Transfer</b></p> <p>___ PS4.A: Wave Properties</p> <p>___ PS4.B: Electromagnetic Radiation</p> <p>___ PS4.C: Information Technologies and Instrumentation</p>	<p><b>LS1: From Molecules to Organisms – Structures and Processes</b></p> <p><input checked="" type="checkbox"/> LS1.A: Structure and Function</p> <p><input checked="" type="checkbox"/> LS1.B: Growth and Development of Organisms</p> <p>___ LS1.C: Organization for Matter and Energy Flow in Organisms</p> <p>___ LS1.D: Information Processing</p> <p><b>LS2: Ecosystems: Interactions, Energy And Dynamics</b></p> <p><input checked="" type="checkbox"/> LS2.A: Interdependent Relationships in Ecosystems</p> <p>___ LS2.B: Cycles of Matter and Energy Transfer in Ecosystems</p> <p>___ LS2.C: Ecosystems Dynamics, Functioning and Resilience</p> <p><input checked="" type="checkbox"/> LS2.D: Social Interactions and Group Behavior</p> <p><input type="checkbox"/> <b>LS3: Heredity: Inheritance &amp; Variation of Traits</b></p> <p>___ LS3.A: Inheritance of Traits</p> <p>___ LS3.B: Variation of Traits</p> <p><b>LS4: Biological Evolution: Unity and Diversity</b></p> <p>___ LS4.A: Evidence of Common Ancestry and Diversity</p> <p>___ LS4.B: Natural Selection</p> <p><input checked="" type="checkbox"/> LS4.C: Adaptation</p>	<p><input type="checkbox"/> <b>ESS1: Earth’s Place in the Universe</b></p> <p>___ ESS1.A: The Universe and Its Stars</p> <p>___ ESS1.B: Earth and the Solar System</p> <p>___ ESS1.C: The History of Planet Earth</p> <p><input type="checkbox"/> <b>ESS2: Earth’s Systems</b></p> <p>___ ESS2.A: Earth Materials and Systems</p> <p>___ ESS2.B: Plate Tectonics &amp; Large-Scale System Interactions</p> <p>___ ESS2.C: The Roles of Water in Earth’s Surface Processes</p> <p>___ ESS2.D: Weather and Climate</p> <p>___ ESS2.E: Biogeology</p> <p><b>ESS3: Earth and Human Activity</b></p> <p>___ ESS3.A: Natural Resources</p> <p>___ ESS3.B: Natural Hazards</p> <p><input checked="" type="checkbox"/> ESS3.C: Human Impacts on Earth Systems</p> <p>___ ESS3.D: Global Climate Change</p>	<p><b>ETSI: Engineering Design</b></p> <p>___ ETS1.A: Defining and Delimiting an Engineering Problem</p> <p><input checked="" type="checkbox"/> ETS1.B: Developing Possible Solutions</p> <p>___ ETS1.C: Optimizing the Design Solution</p> <p><b>ETS2: Links Among Engineering, Technology, Science and Society</b></p> <p><input checked="" type="checkbox"/> ETS2.A: Interdependence of Science, Engineering, and Technology</p> <p><input checked="" type="checkbox"/> ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World</p>

\_\_\_ LS4.D: Biodiversity and Humans

### 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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## SCIENTIFIC AND 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 the 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 design

<b>Unit Title: Characteristics of Life</b>		
<p><b>Content:</b> <i>What is Life? Characteristics of Living Things</i></p> <p>Inventory the 6 Characteristic Traits of Life (RADRON) Respond, Adapt, Develop/Grow, Reproduce, Organization, and Needing Energy. Explain where Living Things come from and what they need to survive.</p> <p><b>Labs:</b>  <i>“Born to Be Alive” Living vs. Nonliving Intro PPT, NJ Species Exploration, Inquiry and Conservation: Birds, Butterflies, Bees and Bats, Hide and Go Seek Adaptation, Dear Dorothy Research Project, NJ Tree Identification</i></p> <p><b><u>Common Core State Standards:</u></b>            CC6-8WH/SS/S/TS7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p>	<p><b><u>21<sup>st</sup> Century</u></b>            9.1.12.A.1            CRITICAL THINKING            9.3.4 A.1            GROUP WORK            9.1.4.C.1  <b>NGSS</b>  <u>LSI: From Molecules to Organisms – Structures and Processes</u>    <u>MS-LS3 Heredity: Inheritance and Variation of Traits</u>    <u>MS-LS4 Biological Evolution: Unity and Diversity</u></p>	<p>Time Frame            3 Weeks/ Year Long            Application</p>

CCSS.ELA-Literacy.WHST.6-8.9 - Draw evidence from informational texts to support analysis reflection, and research.

CC.5.W.7 Research to Build and Present Knowledge: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

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SS3: Earth and Human Activity

Physical Science	Life Science	Earth & Space Science	Engineering, Technology, & The Application of Science
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**CROSSCUTTING CONCEPTS**

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<b>Unit Title: Classifying Life</b>		
<p><b>Content: <i>Classifying Organisms</i></b></p> <p>Clarify why biologists classify organisms.          Relate the levels of classification to the relationships between organisms.          List characteristics used to classify organisms into groups including domains and kingdoms.</p> <p><b>Labs:</b>  <i>Gismo Dichotomous Key Lab, Loose at The Zoo, Kingdom Foldable Book, Bird, Bat, Bee, Butterfly Classification, Lab Exploration of Protists, Moneran-Handwashing Lab, Fungi, Plants and Animals</i></p> <p><b><u>Common Core State Standards:</u></b></p> <p>CC6-8WH/SS/S/TS7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> <p>CCSS.ELA-Literacy.WHST.6-8.9 - Draw evidence from informational texts to support analysis reflection, and research.</p> <p>CC.5.W.7 Research to Build and Present Knowledge: Conduct short research projects that use several sources to build knowledge through investigation of</p>	<p><b><u>21<sup>st</sup> Century</u></b></p> <p>9.1.12.A.1          CRITICAL THINKING          9.3.4 A.1          GROUP WORK          9.1.4.C.1</p> <p><b><u>NGSS</u></b>  <u>LSI: From Molecules to Organisms – Structures and Processes</u></p> <p><u>MS-LS3 Heredity: Inheritance and Variation of Traits</u></p> <p><u>MS-LS4 Biological Evolution: Unity and Diversity</u></p> <p><u>SS3: Earth and Human Activity</u></p>	<p>Time Frame          4 Weeks/ Year Long          Application</p>

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CC.5.R.I.7 Integration of Knowledge and Ideas: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

Physical Science	Life Science	Earth & Space Science	Engineering, Technology, & The Application of Science
<p><input type="checkbox"/> <b>PS1: Matter &amp; Its Interactions</b>            ___ PS1.A: Structure and Properties of Matter            ___ PS1.B: Chemical Reactions            ___ PS1.C: Nuclear Processes</p> <p><input type="checkbox"/> <b>PS2: Motion and Stability: Forces &amp; Interactions</b>            ___ PS2.A: Forces and Motion            ___ PS2.B: Types of Interactions            ___ PS2.C: Stability and Instability in Physical Systems</p> <p><input type="checkbox"/> <b>PS3: Energy</b>            ___ PS3.A: Definitions of Energy            ___ PS3.B: Conservation of Energy &amp; Energy Transfer            ___ PS3.C: Relationship Between Energy and Forces            ___ PS3.D: Energy in Chemical Processes and Everyday Life</p> <p><input type="checkbox"/> <b>PS4: Waves &amp; Their Applications in Technologies for Information Transfer</b>            ___ PS4.A: Wave Properties            ___ PS4.B: Electromagnetic Radiation            ___ PS4.C: Information Technologies and Instrumentation</p>	<p><b>LS1: From Molecules to Organisms – Structures and Processes</b>  <input checked="" type="checkbox"/> LS1.A: Structure and Function  <input checked="" type="checkbox"/> LS1.B: Growth and Development of Organisms  <input checked="" type="checkbox"/> LS1.C: Organization for Matter and Energy Flow in Organisms  <input checked="" type="checkbox"/> LS1.D: Information Processing</p> <p><input type="checkbox"/> <b>LS2: Ecosystems: Interactions, Energy And Dynamics</b>            ___ LS2.A: Interdependent Relationships in Ecosystems            ___ LS2.B: Cycles of Matter and Energy Transfer in Ecosystems            ___ LS2.C: Ecosystems Dynamics, Functioning and Resilience            ___ LS2.D: Social Interactions and Group Behavior</p> <p><input type="checkbox"/> <b>LS3: Heredity: Inheritance &amp; Variation of Traits</b>            ___ LS3.A: Inheritance of Traits            ___ LS3.B: Variation of Traits</p> <p><b>LS4: Biological Evolution: Unity and Diversity</b>            ___ LS4.A: Evidence of Common Ancestry and Diversity  <input checked="" type="checkbox"/> LS4.B: Natural Selection  <input checked="" type="checkbox"/> LS4.C: Adaptation  <input checked="" type="checkbox"/> LS4.D: Biodiversity and Humans</p>	<p><input type="checkbox"/> <b>ESS1: Earth’s Place in the Universe</b>            ___ ESS1.A: The Universe and Its Stars            ___ ESS1.B: Earth and the Solar System            ___ ESS1.C: The History of Planet Earth</p> <p><input type="checkbox"/> <b>ESS2: Earth’s Systems</b>            ___ ESS2.A: Earth Materials and Systems            ___ ESS2.B: Plate Tectonics &amp; Large-Scale System Interactions            ___ ESS2.C: The Roles of Water in Earth’s Surface Processes            ___ ESS2.D: Weather and Climate            ___ ESS2.E: Biogeology</p> <p><b>ESS3: Earth and Human Activity</b>            ___ ESS3.A: Natural Resources            ___ ESS3.B: Natural Hazards  <input checked="" type="checkbox"/> ESS3.C: Human Impacts on Earth Systems            ___ ESS3.D: Global Climate Change</p>	<p><input type="checkbox"/> <b>ETS1: Engineering Design</b>            ___ ETS1.A: Defining and Delimiting an Engineering Problem            ___ ETS1.B: Developing Possible Solutions            ___ ETS1.C: Optimizing the Design Solution</p> <p><input type="checkbox"/> <b>ETS2: Links Among Engineering, Technology, Science and Society</b>            ___ ETS2.A: Interdependence of Science, Engineering, and Technology            ___ ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World</p>

## 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.

## SCIENTIFIC AND ENGINEERING PRACTICES

### Asking Questions and Defining Problems

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### Planning and Carrying Out Investigations

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### 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.

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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

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The goal of science is the construction of the 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

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### 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

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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.

<b>Unit Title: Basic Units of Life</b>		
<p><b>Content: <i>Discovering Cells</i></b></p> <p>Enlighten what cells are. Explain how the invention of the microscope contributed to scientists' understanding of living things. State the cell theory and contributing scientists. Describe how microscopes produce magnified images. Analyze Cell organelles and their structure and function.</p> <p><b>Labs:</b>  <i>Microscope Mastery Labs: Letter D Lab, Colored Thread Lab, Prepared vs Wet Mount Slides, Elodea Plant Cell Lab, Cheek Cell Lab, Back to the Future History of Spontaneous Generation Biogenesis Theory, Bacteria and Virus Slide Investigation, Cell-ebriation Project</i></p> <p><b><u>Common Core State Standards:</u></b></p>	<p><b><u>21<sup>st</sup> Century</u></b></p> <p>9.1.12.A.1            CRITICAL THINKING</p> <p>9.3.4 A.1            GROUP WORK</p> <p>9.1.4.C.1</p> <p>NGSS:  <u>LSI: From Molecules to Organisms – Structures and Processes</u></p> <p><u>MS-LS3 Heredity: Inheritance and Variation of Traits</u></p>	<p>Time Frame            6 Weeks</p>

<p>CC6-8WH/SS/S/TS7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> <p>CCSS.ELA-Literacy.WHST.6-8.9 - Draw evidence from informational texts to support analysis reflection, and research.</p> <p>CC.5.W.7 Research to Build and Present Knowledge: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>CC.5.R.I.7 Integration of Knowledge and Ideas: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p>	<p><u>MS-LS4 Biological Evolution: Unity and Diversity</u></p> <p><u>SS3: Earth and Human Activity</u></p>	
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Physical Science	Life Science	Earth & Space Science	Engineering, Technology, & The Application of Science
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	<p style="text-align: center;"><b>Diversity</b></p> <p><input checked="" type="checkbox"/> LS4.A: Evidence of Common Ancestry and Diversity</p> <p><input checked="" type="checkbox"/> LS4.B: Natural Selection</p> <p><input checked="" type="checkbox"/> LS4.C: Adaptation</p> <p><input checked="" type="checkbox"/> LS4.D: Biodiversity and Humans</p>		
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<h2 style="text-align: center;">Unit Title: Life Processes</h2>		
<p><b>Content:</b> <i>Cell Processes and Energy</i></p> <p>Explain how water is important to the function of cells.          Identify the four main kinds of organic compounds in living things.          Recognize the 5 Cell Processes- Metabolism, Respiration, Osmosis, Diffusion, Reproduction and Need Energy. Photosynthesis, Mitosis, Respiration explained.</p> <p><b>Labs:</b>  <i>Osmosis-Diffusion Carrot/Celery Labs, Mitosis Onion Root Lab, Nutrition and Healthy Choice Unit</i></p> <p><b><u>Common Core State Standards:</u></b></p> <p>CC6-8WH/SS/S/TS7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> <p>CCSS.ELA-Literacy.WHST.6-8.9 - Draw evidence from informational texts to support analysis reflection, and research.</p> <p>CC.5.W.7 Research to Build and Present Knowledge: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>CC.5.R.I.7 Integration of Knowledge and Ideas: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p>	<p><b><u>21<sup>st</sup> Century</u></b></p> <p>9.1.12.A.1</p> <p>CRITICAL THINKING</p> <p>9.3.4 A.1</p> <p>GROUP WORK</p> <p>9.1.4.C.1</p> <p>NGSS:  <u>LSI: From Molecules to Organisms – Structures and Processes</u></p> <p><u>MS-LS3 Heredity: Inheritance and Variation of Traits</u></p> <p><u>MS-LS4 Biological Evolution: Unity and Diversity</u></p>	<p>Time Frame 4 Weeks</p>

Physical Science	Life Science	Earth & Space Science	Engineering, Technology, & The Application of Science
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- PS1: Matter & Its Interactions**
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- \_\_\_ PS1.B: Chemical Reactions
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- PS4: Waves & Their Applications in Technologies for Information Transfer**
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- \_\_\_ PS4.B: Electromagnetic Radiation
- \_\_\_ PS4.C: Information Technologies and Instrumentation

**LS1: From Molecules to Organisms – Structures and Processes**

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- LS1.B: Growth and Development of Organisms
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<b>Unit Title: The Study of Heredity</b>		
<p><b>Content: <i>Genetics</i></b>          Describe the results of Mendel’s experiments.          Identify what controls the inheritance of traits in organisms.          Define Probability and utilize Punnett Squares. Explain what is meant by genotype and phenotype. Describe the role of chromosomes. Explain what forms the genetic code. Describe Proteins and mutations and how they affect an organism. Identify some patterns of inheritance in humans. Describe the functions of sex chromosomes. Identify major causes of genetic disorders and how they are traced, diagnosed and treated. Portray the advances in Genetics via the goal of the Human Genome Project.</p> <p><b><u>Labs:</u></b>  <i>Punnett Square Lab, DNA Building Lab, Coin Flip Lab, Build a Human Face Lab, Monster’s Inc. Lab, Dragon On Lab, Human Genetic World Wide Web Lab</i></p> <p><b><u>Common Core State Standards:</u></b>          CC6-8WH/SS/S/TS7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.          CCSS.ELA-Literacy.WHST.6-8.9 - Draw evidence from informational texts to support analysis reflection, and research.</p>	<p><b><u>21<sup>st</sup> Century</u></b>          9.1.12.A.1          CRITICAL THINKING          9.3.4 A.1          GROUP WORK          9.1.4.C.1</p> <p><b><u>NGSS</u></b>  <u>LSI: From Molecules to Organisms – Structures and Processes</u></p> <p><u>MS-LS3 Heredity: Inheritance and Variation of Traits</u></p> <p><u>MS-LS4 Biological Evolution: Unity and Diversity</u></p>	<p>Time Frame          4 Weeks</p>

CC.5.W.7 Research to Build and Present Knowledge: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

CC.5.R.I.7 Integration of Knowledge and Ideas: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

Physical Science	Life Science	Earth & Space Science	Engineering, Technology, & The Application of Science
<p><input type="checkbox"/> <b>PS1: Matter &amp; Its Interactions</b>            ___ PS1.A: Structure and Properties of Matter            ___ PS1.B: Chemical Reactions            ___ PS1.C: Nuclear Processes</p> <p><input type="checkbox"/> <b>PS2: Motion and Stability: Forces &amp; Interactions</b>            ___ PS2.A: Forces and Motion            ___ PS2.B: Types of Interactions            ___ PS2.C: Stability and Instability in Physical Systems</p> <p><input type="checkbox"/> <b>PS3: Energy</b>            ___ PS3.A: Definitions of Energy            ___ PS3.B: Conservation of Energy &amp; Energy Transfer            ___ PS3.C: Relationship Between Energy and Forces            ___ PS3.D: Energy in Chemical Processes and Everyday Life</p> <p><input type="checkbox"/> <b>PS4: Waves &amp; Their Applications in Technologies for Information Transfer</b>            ___ PS4.A: Wave Properties            ___ PS4.B: Electromagnetic Radiation            ___ PS4.C: Information Technologies and Instrumentation</p>	<p><input type="checkbox"/> <b>LS1: From Molecules to Organisms – Structures and Processes</b>  <u>X</u> LS1.A: Structure and Function  <u>X</u> LS1.B: Growth and Development of Organisms            ___ LS1.C: Organization for Matter and Energy Flow in Organisms            ___ LS1.D: Information Processing</p> <p><input type="checkbox"/> <b>LS2: Ecosystems: Interactions, Energy And Dynamics</b>            ___ LS2.A: Interdependent Relationships in Ecosystems            ___ LS2.B: Cycles of Matter and Energy Transfer in Ecosystems            ___ LS2.C: Ecosystems Dynamics, Functioning and Resilience            ___ LS2.D: Social Interactions and Group Behavior</p> <p><b>LS3: Heredity: Inheritance &amp; Variation of Traits</b>  <u>X</u> LS3.A: Inheritance of Traits  <u>X</u> LS3.B: Variation of Traits</p> <p><b>LS4: Biological Evolution: Unity and Diversity</b>  <u>X</u> LS4.A: Evidence of Common Ancestry and Diversity  <u>X</u> LS4.B: Natural Selection  <u>X</u> LS4.C: Adaptation  <u>X</u> LS4.D: Biodiversity and Humans</p>	<p><input type="checkbox"/> <b>ESS1: Earth’s Place in the Universe</b>            ___ ESS1.A: The Universe and Its Stars            ___ ESS1.B: Earth and the Solar System            ___ ESS1.C: The History of Planet Earth</p> <p><input type="checkbox"/> <b>ESS2: Earth’s Systems</b>            ___ ESS2.A: Earth Materials and Systems            ___ ESS2.B: Plate Tectonics &amp; Large-Scale System Interactions            ___ ESS2.C: The Roles of Water in Earth’s Surface Processes            ___ ESS2.D: Weather and Climate            ___ ESS2.E: Biogeology</p> <p><input type="checkbox"/> <b>ESS3: Earth and Human Activity</b>            ___ ESS3.A: Natural Resources            ___ ESS3.B: Natural Hazards            ___ ESS3.C: Human Impacts on Earth Systems            ___ ESS3.D: Global Climate Change</p>	<p><input type="checkbox"/> <b>ETS1: Engineering Design</b>            ___ ETS1.A: Defining and Delimiting an Engineering Problem            ___ ETS1.B: Developing Possible Solutions            ___ ETS1.C: Optimizing the Design Solution</p> <p><input type="checkbox"/> <b>ETS2: Links Among Engineering, Technology, Science and Society</b>            ___ ETS2.A: Interdependence of Science, Engineering, and Technology  <u>X</u> ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World</p>

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**CROSSCUTTING CONCEPTS**

<p><b>🦋🦋🦋 Patterns</b> Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.</p> <p><b>🦋🦋🦋 Cause and Effect: Mechanism and Explanation</b> 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.</p>	<p><b>🦋🦋🦋 Scale, Proportion, and Quantity</b> 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.</p> <p><b>🦋🦋🦋 Systems and System Models</b> 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.</p>	<p><b>🦋🦋🦋 Energy and Matter: Flows, Cycles, and Conservation</b> Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems’ possibilities and limitations.</p> <p><b>🦋🦋🦋 Structure and Function</b> The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.</p> <p><b>🦋🦋🦋 Stability and Change</b> 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.</p>
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**SCIENTIFIC AND 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 the 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**

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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.

## **Unit Title: Viruses, Bacteria, Protists, Animal, and Fungi**

<b>Content: Diversity of Living Things</b>	<b>21<sup>st</sup> Century</b>	<b>Time Frame</b>
Proved an overview of the 5 Kingdoms of Life. List characteristics of viruses and state reasons why they are considered nonliving. Describe structure of bacteria cells. Compare autotrophs and heterotrophs and how	9.1.12.A.1 CRITICAL THINKING 9.3.4 A.1	4 Weeks



energy is released. Describe conditions under which bacteria thrive and reproduce. Explain the positive role of bacteria. Describe the characteristics of protists and examples of each. Name the characteristics that all fungi share. Explain how they reproduce and their role in nature.

**Labs:**

*Dichotomous Key Lab, Live Protist and Pond Water Lab, Fungus Lab, Virus/Bacteria Websites, Handwashing Workshop, Human Body vs. other Kingdoms(Circulatory, Digestive, Nervous)*

**Common Core State Standards:**

CC6-8WH/SS/S/TS7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

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GROUP WORK

9.1.4.C.1

NGSS:

LS1: From Molecules to Organisms – Structures and Processes

MS-LS3 Heredity: Inheritance and Variation of Traits

MS-LS4 Biological Evolution: Unity and Diversity

Physical Science	Life Science	Earth & Space Science	Engineering, Technology, & The Application of Science
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## SCIENTIFIC AND ENGINEERING PRACTICES

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<b>Unit Title: Human Body and Health</b>		
<p><b>Content:</b> <i>Systems and Organization of the Human Body</i></p> <p>Identify the levels of organization in the body. Define homeostasis, Identify the structure and function of the skeletal, respiratory, digestive, muscular, skin, nervous, endocrine, and circulatory systems.</p> <p><b>Labs:</b>  <i>Multiple Intelligence and Brain Workshop, Valentine’s Day Heart Workshop, Blood Transfusion Lab, Skeleton Lab, Nervous System Lab, SuperSize Me Nutrition Unit &amp; Digestive System, New Year Health and Muscular System, Sunscreen and Skin Workshop,</i></p> <p><b><u>Common Core State Standards:</u></b></p> <p>CC6-8WH/SS/S/TS7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> <p>CCSS.ELA-Literacy.WHST.6-8.9 - Draw evidence from informational texts to support analysis reflection, and research.</p> <p>CC.5.W.7 Research to Build and Present Knowledge: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>CC.5.R.I.7 Integration of Knowledge and Ideas: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p>	<p><b><u>21<sup>st</sup> Century</u></b></p> <p>9.1.12.A.1</p> <p>CRITICAL THINKING</p> <p>9.3.4 A.1</p> <p>GROUP WORK</p> <p>9.1.4.C.1</p> <p>Standards</p> <p>5.1.8 A-D</p> <p>5.3.8 A1-A2</p> <p>5.3.8 B1-B2</p>	<p>Time Frame</p> <p>4 Weeks</p>

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 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.

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 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.

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

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<b>SCIENTIFIC AND ENGINEERING PRACTICES</b>		

**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 the 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.

**Unit Title: Ecology**



<p><b>Content: <i>Populations, Communities, Ecosystems, Biomes, and Living Resources</i></b></p> <p>Identify the biotic and abiotic factors in an environment. Describe the levels of organization within an ecosystem. Describe and analyze populations and limiting factors. Explain how adaptations are related to survival. Describe interactions among ecosystems. Identify symbiotic relationships. Describe the differences between primary and secondary succession. Describe biogeography, name the six major biomes found on Earth. Explain energy roles in an ecosystem. Describe how energy moves and is available through an ecosystem. Explain why and how populations hibernate and migrate.</p> <p><b>Labs:</b>  <i>Endangered Species Project, Population Lab, A Day In Cape May (field trip/lab), New Jersey Flora and Fauna: Trees, Birds, Bats, Butterflies</i></p> <p><b><u>Common Core State Standards:</u></b></p> <p>CC6-8WH/SS/S/TS7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p> <p>CCSS.ELA-Literacy.WHST.6-8.9 - Draw evidence from informational texts to support analysis reflection, and research.</p> <p>CC.5.W.7 Research to Build and Present Knowledge: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>CC.5.R.I.7 Integration of Knowledge and Ideas: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p>	<p><b><u>21<sup>st</sup> Century</u></b></p> <p>9.1.12.A.1</p> <p>CRITICAL THINKING</p> <p>9.3.4 A.1</p> <p>GROUP WORK</p> <p>9.1.4.C.1</p> <p>Standards</p> <p>5.3.8 C1, E1-E2</p> <p><b><u>NGSS</u></b></p> <p><u>MS-LS1</u>: From Molecules to Organisms- Structures and Processes</p> <p><u>MS-LS2</u>: Ecosystems: Interactions, Energy and Dynamics</p> <p><u>MS-LS4</u>: Biological Evolution: Unity and Diversity</p>	<p>Time Frame</p> <p>4 Weeks</p>
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- PS1: Matter & Its Interactions**
- \_\_\_ PS1.A: Structure and Properties of Matter
- \_\_\_ PS1.B: Chemical Reactions
- \_\_\_ PS1.C: Nuclear Processes

- PS2: Motion and Stability: Forces & Interactions**
- \_\_\_ PS2.A: Forces and Motion
- \_\_\_ PS2.B: Types of Interactions
- \_\_\_ PS2.C: Stability and Instability in Physical Systems

- PS3: Energy**
- \_\_\_ PS3.A: Definitions of Energy
- \_\_\_ PS3.B: Conservation of Energy & Energy Transfer
- \_\_\_ PS3.C: Relationship Between Energy and Forces
- \_\_\_ PS3.D: Energy in Chemical Processes and Everyday Life

- PS4: Waves & Their Applications in Technologies for Information Transfer**
- \_\_\_ PS4.A: Wave Properties
- \_\_\_ PS4.B: Electromagnetic Radiation
- \_\_\_ PS4.C: Information Technologies and Instrumentation

**LS1: From Molecules to Organisms – Structures and Processes**

- \_\_\_ LS1.A: Structure and Function
- \_\_\_ LS1.B: Growth and Development of Organisms
- \_\_\_ LS1.C: Organization for Matter and Energy Flow in Organisms
- \_\_\_ LS1.D: Information Processing

**LS2: Ecosystems: Interactions, Energy And Dynamics**

- \_\_\_ LS2.A: Interdependent Relationships in Ecosystems
- \_\_\_ LS2.B: Cycles of Matter and Energy Transfer in Ecosystems
- \_\_\_ LS2.C: Ecosystems Dynamics, Functioning and Resilience
- \_\_\_ LS2.D: Social Interactions and Group Behavior

**LS3: Heredity: Inheritance & Variation of Traits**

- \_\_\_ LS3.A: Inheritance of Traits
- \_\_\_ LS3.B: Variation of Traits

**LS4: Biological Evolution: Unity and Diversity**

- \_\_\_ LS4.A: Evidence of Common Ancestry and Diversity
- \_\_\_ LS4.B: Natural Selection
- \_\_\_ LS4.C: Adaptation
- \_\_\_ LS4.D: Biodiversity and Humans

- ESS1: Earth’s Place in the Universe**
- \_\_\_ ESS1.A: The Universe and Its Stars
- \_\_\_ ESS1.B: Earth and the Solar System
- \_\_\_ ESS1.C: The History of Planet Earth

- ESS2: Earth’s Systems**
- \_\_\_ ESS2.A: Earth Materials and Systems
- \_\_\_ ESS2.B: Plate Tectonics & Large-Scale System Interactions
- \_\_\_ ESS2.C: The Roles of Water in Earth’s Surface Processes
- \_\_\_ ESS2.D: Weather and Climate
- \_\_\_ ESS2.E: Biogeology

- ESS3: Earth and Human Activity**
- \_\_\_ ESS3.A: Natural Resources
- \_\_\_ ESS3.B: Natural Hazards
- \_\_\_ ESS3.C: Human Impacts on Earth Systems
- \_\_\_ ESS3.D: Global Climate Change

- ETS1: Engineering Design**
- \_\_\_ ETS1.A: Defining and Delimiting an Engineering Problem
- \_\_\_ ETS1.B: Developing Possible Solutions
- \_\_\_ ETS1.C: Optimizing the Design Solution

- ETS2: Links Among Engineering, Technology, Science and Society**
- \_\_\_ ETS2.A: Interdependence of Science, Engineering, and Technology
- \_\_\_ ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World

**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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## **IX. MODIFICATIONS: INCLUSION TECHNIQUES/ENRICHMENTS**

- 1.) Provide questioning that is authentic; relate to student interests, social/family background and knowledge related to their community.
- 2.) Provide students with visual representation related to the scientific topic presented. (e.g. multisensory techniques-auditory/visual aide : Pictures, illustrations, graphs, charts, data tables, multimedia)
- 3.) Provide opportunities to incorporate and connect students with people of similar backgrounds as related to the topics presented in class. (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles and biographies)
- 4.) Provide multiple grouping opportunities to share their ideas and in order to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences)
- 5.) Engage student with a variety of Science and Engineering practices in order to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- 6.) Use project-based science learning to connect science with observable phenomena.
- 7.) Structure learning around explaining or solving a social or community-based issue.
- 8.) Provide ELL students with multiple literacy strategies
- 9.) Collaborate with after –school programs and clubs to extend learning opportunities.
- 10.) Provide authentic learning experiences that are unique to local informal education centers.
- 11.) Restructure lesson using UDL principles  
([http://cast.org/our-work/about-udl.html#.VXmoXcfD\\_UA](http://cast.org/our-work/about-udl.html#.VXmoXcfD_UA) )

## **X. INTERDISCIPLINARY CONNECTIONS/MULTICULTURAL MATERIALS**

**Videos:**

*Bill Nye "Measuring In Science"*

*Bill Nye "Cells"*

*Bill Nye "Genetics"*

*Eyewitness Video "Moths and Butterflies"*

*Eyewitness Video "Birds"*

*Bat Conservation International "Secret Life of Bats"*

*Safari Montage Segments: Human Body, Mitosis, Photosynthesis, Respiration*

**Art:**

*Locker/Butterfly Get to Know You-First Day Activities*

*Endangered Species Shirts*

*Bird,Bat Butterfly Projects*

*Edible/ 3D Cell Models*

**Music:**

*Classical Music while working independently*

*Lab Safety Rap*

*Cell Song*

**Other:**

*Seasonal Poetry*

**XI. MATERIALS/TECHNOLOGY**

Prentice Hall Life Science 2007

Mimio/Smartboard

Mimio Voters

Laptops

Document Camera

Compound Microscopes

Dissecting Microscopes

Triple Beam Balances

Graduated Cylinders

Test Tubes

Metric Rulers

Yearly Orders from the following vendors:

Science Kit and Boreal Lab

Educational Innovations