

## SCIENCE 21 CURRICULUM MAP

### Grade Level: 5

#### Essential Questions for Grade Level:

- How do scientists use tools to observe, describe, and measure the interactions they find in the natural world?
- How does matter interact with other matter?
- What are cells in living organisms and how do they help an organism survive?
- How are the internal systems of organisms structured to help an organism survive?
- What forms of energy do we find in our world and how does that energy interact with matter?

Unit/Timeframe	Unit Essential Questions	Unit Objectives	Concepts/Major Understandings	NYS Performance Indicators
<p>Unit 1: Interactions of Chemical Matter</p> <p>September. – mid-October</p>	<ul style="list-style-type: none"> <li>• What is a “fair” test?</li> <li>• How can we be safe when we investigate?</li> <li>• What is matter?</li> <li>• How do elements react with one another?</li> <li>• How do substances react with one another?</li> </ul>	<p><b>Students will be able to investigate interactions in the natural world using controlled studies.</b></p> <ol style="list-style-type: none"> <li>1. Be able to summarize the steps of the scientific method.</li> <li>2. Be able to engage in the process of science that includes observing, questioning, predicting, hypothesizing, conducting investigations, analyzing data and communicating their findings in a variety of ways.</li> <li>3. Be able to define and describe what variables are (controlled, manipulated, dependent).</li> <li>4. Be able to design a controlled study and use that model for an investigation.</li> <li>5. Be able to develop and carry out a controlled study.</li> <li>6. Be able to observe, describe and record the properties of materials using controlled studies.</li> <li>7. Be able to make connections to real-world implications and uses of the compound, “sodium polyacrylate”.</li> </ol>	<ul style="list-style-type: none"> <li>• The process of scientific inquiry includes observing natural phenomena, conducting controlled experiments to test hypotheses, gathering evidence and analyzing data, constructing explanations, and presenting the findings to others.</li> <li>• In a controlled experiment, the effect of changes in the manipulated variable (independent variable) on another variable (dependent variable) is measured. The investigator must identify all the other possible variables that can affect the manipulated variable and design an experiment in which these are kept constant.</li> <li>• The decrease in viscosity of a polymer upon addition of water can be investigated using a controlled study.</li> <li>• Atoms are the smallest particles of a chemical element and molecules are the smallest particles of a compound. Elements combine in many ways to produce compounds.</li> </ul>	<p>SI 2.1A SI 2.3A SI 2.3 SI 2.2A-C SI 2.2A-C SI 2.2A-C SI1.2 A-C</p>

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<p>Unit 2: Interactions in the Microworld</p> <p>Mid-October-December</p>	<ul style="list-style-type: none"> <li>• What are cells and how do they carry out life functions?</li> <li>• How are cells organized into working groups?</li> <li>• How are organisms grouped and classified?</li> <li>• How do living organisms get the energy they need and how do they use it?</li> </ul>	<p><b>Students will be able to explore interactions in the microworld.</b></p> <ol style="list-style-type: none"> <li>1. Be able to use magnifying tools to study living and non-living things.</li> <li>2. Be able to determine the differences between living and non-living things.</li> <li>3. Be able to use a taxonomic key to identify organisms.</li> <li>4. Be able to determine the differences between plant and animal cells.</li> <li>5. Be able to identify and list the functions of cell parts.</li> <li>6. Be able to compare organisms in terms of systems, organs, tissues and cells.</li> <li>7. Be able to develop an explanation of how cells function to enable an organism to survive.</li> <li>8. Be able to explore how the survival of a cell or organism may impact its environment and possibly the life and environment of another organism.</li> </ol>	<ul style="list-style-type: none"> <li>• The cell theory is a well-tested and accepted explanation of the relationship between cells and living things. It states that all living things are composed of one or more cells, that the cell is the smallest unit having the properties of life, and that all cells are produced from the growth and division of single cells.</li> <li>• Cells, and some living organisms, are too small to see without a microscope. When magnified, observable structures can be seen in all cells. These structures enable the cell to perform basic functions of life.</li> <li>• Cells grow and divide, producing more cells for growth and repair. One-celled organisms reproduce by cell division.</li> <li>• Scientists use a classification system to organize living things into groups based on important biological similarities, so that they are easier to study. Organisms are classified into seven levels, from kingdom (most general) to species (most specific).</li> <li>• Multicellular organisms have specialized cells, with different shapes and sizes, to carry out the functions of the organism; groups of specialized cells form tissue, groups of tissue form organs, and organs working together form organ systems.</li> <li>• If there is a failure in a structure or in the functioning of an organism, or if the organism is damaged by infection from another organism, the result is disease.</li> </ul>	<p>LE 1.1 LE 1.1 LE 1.1 A,B LE 1.1A-H LE 4.4A LE 4.4B LE 4.4B,C,D LE 4.4A-H</p>

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<p>Unit 3: Interactions in the Human Body</p> <p>January – Mid-March</p>	<ul style="list-style-type: none"> <li>• How do organs and tissues interact with one another and carry out life functions?</li> <li>• How do organ systems work and respond to changing demands of an organism?</li> <li>• How are traits in organisms passed from one generation to another?</li> <li>• How do we keep our bodies healthy?</li> </ul>	<p><b>Students will be able to explore interactions in the human body.</b></p> <ol style="list-style-type: none"> <li>1. Be able to analyze how a simple human activity illustrates the overlapping functions of both the respiratory and circulatory systems.</li> <li>2. Be able to determine the role and parts of the human respiratory system.</li> <li>3. Be able to determine the role and parts of the human circulatory system.</li> <li>4. Be able to investigate how the respiratory and circulatory systems interact.</li> <li>5. Be able to analyze how a simple human activity illustrates the overlapping functions of both the muscular and skeletal systems.</li> <li>6. Be able to determine the role and parts of the human muscular system.</li> <li>7. Be able to determine the role and parts of the human skeletal system.</li> <li>8. Be able to investigate how the muscular and skeletal systems interact.</li> <li>9. Be able to explore how human inheritance operates and investigate the role of genetics in our life.</li> </ol>	<ul style="list-style-type: none"> <li>• Humans have organ systems to carry out functions such as respiration, circulation, movement, control and coordination. These organ systems interact with each other to serve the organism as a whole.</li> <li>• The tissues and organs of the respiratory system take in oxygen and deliver it to the blood. The respiratory system works together with the heart, blood vessels and blood of the circulatory system to provide oxygen to every cell in the body and to remove carbon dioxide and water, the end products of cellular respiration.</li> <li>• Interaction between the skeletal system and the muscular system enables movement of the body. This interaction is coordinated by the nervous system.</li> <li>• Heredity is the passage of instructions for specifying traits of an organism from parents to offspring. Genes are the units of information about heritable traits, and each gene has a particular location on a particular chromosome. All of the heritable bits of information that are necessary to produce a new individual are carried by the DNA molecules that make up the genes.</li> <li>• Genes occur in pairs and offspring inherit one copy of each gene from each parent. A gene is dominant when its effect on a trait overshadows that of the other gene (recessive) paired with it. This is Mendel’s Law of Dominance.</li> <li>• Punnett squares help to visualize the possible outcomes for inheritance of a trait and can be used to determine the probability of a particular outcome for a trait that is controlled by a single gene. Pedigree charts can track the inheritance of traits from generation to generation.</li> <li>• Biological adaptations are heritable traits that arise from mutations and help an organism survive and reproduce.</li> </ul>	<p>LE 1.2D,F LE 1.2A, B,D,F</p> <p>LE 1.2A,B,C,F LE 1.2 A LE 1.2 A-G LE 1.2A LE 1.2 A-G LE 2.2A LE 2.2C</p>

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Unit 4: Interactions in the Environment  Mid-March – June	<ul style="list-style-type: none"> <li>• How does matter move and change in the environment?</li> <li>• How is energy transferred and transformed as it flows through a food chain?</li> <li>• How do meteorologists organize and use information about air, water, and land to predict the weather?</li> </ul>	<p><b>Students will be able to investigate interactions in the environment.</b></p> <ol style="list-style-type: none"> <li>1. Be able to identify the characteristics of a physical change and a chemical change.</li> <li>2. Be able to investigate chemical reactions and how photosynthesis (as a chemical reaction) is so crucial to all living things.</li> <li>3. Be able to investigate how energy transfer in the environment is necessary for plants to grow and develop.</li> <li>4. Be able to explore the energy transfers that occur in weather systems.</li> <li>5. Be able to draw relationships between weather and climate factors and the characteristics of an ecosystem.</li> <li>6. Be able to identify the characteristics of their own local ecosystem and relate them to larger ecosystems.</li> <li>7. Be able to research the role of energy transfer on ecosystems, on a global scale.</li> </ol>	<ul style="list-style-type: none"> <li>• In physical changes, substances retain their characteristic properties, while in chemical changes, new substances are formed; in all changes, mass and energy are conserved.</li> <li>• During photosynthesis, green plants use energy from the Sun to convert carbon dioxide and water into sugar and oxygen. The stored chemical energy in sugar is then transformed by plants into all the products they need for growth and metabolism; the oxygen is used by all organisms for cellular respiration.</li> <li>• Animals cannot make their own food and they get the food they need by eating plants or by eating other animals that have eaten plants; the energy from the food is used for all their life processes.</li> <li>• Model ecosystems, consisting of populations of several species in their suitable habitats, help us to observe the complex relationships between living organisms and their environment and they illustrate the flow of energy between plants and animals.</li> </ul>	PS 4.3A LE 6.2a-c LE 6.1A-C PS 2.2A, B PS 2.1A-C PS 2.2A-C PS 4.2A