

## **Connecticut State Department of Education**

### Science Curriculum Standards

#### Middle School Grades 6-8

#### **Essential Questions**

How is scientific knowledge created and communicated?

#### ***Properties of Matter***

How does the structure of matter affect the properties and uses of materials?

#### ***Matter and Energy in Ecosystems***

How do matter and energy flow through ecosystems?

#### ***Energy in the Earth's Systems***

How do external and internal sources of energy affect the Earth's systems?

#### ***Science and Technology in Society***

How do science and technology affect the quality of our lives?

#### ***Energy Transfer and Transformations***

What is the role of energy in our world?

#### ***Structure and Function***

How are organisms structured to ensure efficiency and survival?

#### ***Forces and Motion***

What makes objects move the way they do?

#### ***Heredity and Evolution***

What processes are responsible for life's unity and diversity?

#### ***Earth in the Solar System***

How does the position of Earth in the solar system affect conditions on our planet?

#### **Science Standards**

#### ***Scientific Inquiry (used in all courses)***

- Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena.
- Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation.
- Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists.

#### ***Scientific Literacy (used in all courses)***

- Scientific literacy includes speaking, listening, presenting, interpreting, reading and writing about science.
- Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media.

#### ***Scientific Numeracy (used in all courses)***

**Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas.**

Students will identify questions that can be answered through scientific investigation.

Students will read, interpret and examine the credibility of scientific claims in different sources of information.

Students will design and conduct appropriate types of scientific investigations to answer different questions.

Students will identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.

Students will use appropriate tools and techniques to make observations and gather data.

Students will use mathematical operations to analyze and interpret data.

Students will identify and present relationships between variables in appropriate graphs.

Students will draw conclusions and identify sources of error.

Students will provide explanations to investigated problems or questions.

Students will communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

### ***Properties of Matter***

**Materials can be classified as pure substances or mixtures, depending on their chemical and physical properties.**

Students will describe the properties of common elements, such as oxygen, hydrogen, carbon, iron and aluminum.

Students will describe how the properties of simple compounds, such as water and table salt, are different from the properties of the elements of which they are made.

Students will explain how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.

### ***Matter and Energy in Ecosystems***

**An ecosystem is composed of all the populations that are living in a certain space and the physical factors with which they interact.**

Students will describe how abiotic factors, such as temperature, water and sunlight, affect the ability of plants to create their own food through photosynthesis.

Students will explain how populations are affected by predator-prey relationships.

Students will describe common food webs in different Connecticut ecosystems.

### *Energy in the Earth's Systems*

**Variations in the amount of the sun's energy hitting the Earth's surface affect daily and seasonal weather patterns.**

Students will describe the effect of heating on the movement of molecules in solids, liquids and gases.

Students will explain how local weather conditions are related to the temperature, pressure and water content of the atmosphere and the proximity to a large body of water.

Students will explain how the uneven heating of the Earth's surface causes winds.

### *Science and Technology in Society*

**Water moving across and through earth materials carries with it the products of human activities.**

Students will explain the role of septic and sewage systems on the quality of surface and ground water.

Students will explain how human activity may impact water resources in Connecticut, such as ponds, rivers and the Long Island Sound ecosystem.

**Technology allows us to improve food production and preservation, thus improving our ability to meet the nutritional needs of growing populations.**

Students will describe how freezing, dehydration, pickling and irradiation prevent food spoilage caused by microbes.

**In the design of structures there is a need to consider factors such as function, materials, safety, cost and appearance.**

Students will explain how beam, truss and suspension bridges are designed to withstand the forces that act on them.

### *Energy Transfer and Transformations*

**Energy provides the ability to do work and can exist in many forms.**

Students will explain the relationship among force, distance and work, and use the relationship ( $W=F \times D$ ) to calculate work done in lifting heavy objects.

Students will explain how simple machines, such as inclined planes, pulleys and levers, are used to create mechanical advantage.

Students will describe how different types of stored (potential) energy can be used to make objects move.

### ***Structure and Function***

**Many organisms, including humans, have specialized organ systems that interact with each other to maintain dynamic internal balance.**

Students will describe the basic structures of an animal cell, including nucleus, cytoplasm, mitochondria and cell membrane, and how they function to support life.

Students will describe the structures of the human digestive, respiratory and circulatory systems, and explain how they function to bring oxygen and nutrients to the cells and expel waste materials.

Students will explain how the human musculo-skeletal system supports the body and allows movement.

### ***Energy in the Earth's Systems***

**Landforms are the result of the interaction of constructive and destructive forces over time.**

Students will describe how folded and faulted rock layers provide evidence of the gradual up and down motion of the Earth's crust.

Students will explain how glaciation, weathering and erosion create and shape valleys and floodplains.

Students will explain how the boundaries of tectonic plates can be inferred from the location of earthquakes and volcanoes.

### ***Forces and Motion***

**An object's inertia causes it to continue moving the way it is moving unless it is acted upon by a force to change its motion.**

Students will calculate the average speed of a moving object and illustrate the motion of objects in graphs of distance over time.

Students will describe the qualitative relationships among force, mass and changes in motion.

Students will describe the forces acting on an object moving in a circular path.

### ***Heredity and Evolution***

**Reproduction is a characteristic of living systems and it is essential for the continuation of every species.**

Students will explain the similarities and differences in cell division in somatic and germ cells.

Students will describe the structure and function of the male and female human reproductive systems, including the process of egg and sperm production.

Students will describe how genetic information is organized in genes on chromosomes, and explain sex determination in humans.

### ***Earth in the Solar System***

**The solar system is composed of planets and other objects that orbit the sun.**

Students will explain the effect of gravity on the orbital movement of planets in the solar system.

Students will explain how the regular motion and relative position of the sun, Earth and moon affect the seasons, phases of the moon and eclipses.