Science (Grade 6)

Course Description:

The curriculum for this required course is developed from the Next Generation Science Standards: http://www.nextgenscience.org/. The following practices are essential for all students to learn and be successful in science:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

We use a variety of instructional strategies and provide students with the opportunity to develop the above skills while learning about Scientific Method, Graphing, Ecosystems & Organisms, and Earth History. Additionally, we include Engineering/Design challenges that encourage students to problem solve and work collaboratively. The information in this course overview outlines what students should understand and be able to do by the end of the semester/year.

Mastery Standards:

Overarching NextGen Standards:

- Scientific inquiry is the driving force behind problem solving, the development of new careers and technology, and in some cases, the creation of new problems with which society must contend.
- Scientists are limited in their knowledge by imperfect technology and other limitations, so they must develop theories and models that can change and adapt to better understand the world around us.
- Problem solving involves a safe, detailed, and orderly process, so that knowledge can be acquired, presented, and critiqued by doing experiments and investigations.
- Problems need to be precisely defined so that possible solutions can be evaluated, tested, and modified in order to achieve the optimal solution or design.

MS-ESS2 Earth's Systems:

Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. (MS-ESS2-2)

Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. (MS-ESS2-3)

Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. (MS-ESS2-4)

MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (MS-LS2-1)

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (MS-LS2-2)

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (MS-LS2-4)

MS-ETS1-4 Engineering Design:

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (MS-ETS1-1)

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2)

Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (MS-ETS1-3)

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. (MS-ETS1-4)

Unit	Description of Unit and Learning Targets
Unit Title: Scientific Method Essential Questions: ● Why is the study of science important?	Students will… Learning Targets: ● Work safely in a science lab. ● Differentiate between qualitative and quantitative data. ● Determine the correct tool and appropriately measure mass, volume, temperature and length with accuracy. ● Identify and create questions (problems) and hypotheses that can be answered through scientific investigations. ● Develop an appropriate “experiment” description which lists my materials and the step-by step procedures to test any question in order for my experiments to be repeatable. ● Identify the independent, dependent, and control variables in an experiment and explain the impact that variables have on scientific experiments. ● Construct a conclusion for an experiment that includes a claim, evidence, and reasoning to communicate my results.
Unit Title: Graphing Essential Questions: ● How do scientists organize their data? ● How do graphs show the results of a lab?	Students will… Learning Targets: ● Identify the parts of a graph including the independent and dependent variables ● Organize my data in a data table based on independent and dependent variables ● Determine the type of graph to create based on the type of data collected ● Construct a graph with data collected in scientific experiments
Unit Title: Design Thinking	Students will…

Essential Questions: ● How can the engineering/design process benefit us in solving problems in our lives?	Learning Targets: ● Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria/constraints of the problem. ● Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
Unit Title: Ecology Essential Questions: ● What can cause populations to change? ● How might changes of an ecosystem affect the plants and animals that live there?	Students will… Learning Targets: ● Identify evidence of interactions between organisms/environment. ● Predict possible motives for these interactions. ● Describe the function that food serves in organisms. ● Describe how plants produce their own nutrients. ● Identify producer/consumers/decomposers in a food chain/web and describe the flow of energy from organism to organism ● Determine how a change in a population in a food chain/web will directly and indirectly affect other populations.
Unit Title: Earth History Essential Questions: ● How do people figure out that the earth and life on earth have changed over time?	Students will… Learning Targets: ● Describe the Theory of Plate Tectonics and how fossil evidence supports this theory ● Create a scale model of Earth's layers including composition, temperature, thickness, and state of matter of each layer ● Explain how convection currents cause tectonic plates to move ● Differentiate between the three types of plate boundaries and the land formations that result from each