# Science 6 Course Overview

| Unit | Major Concepts | Skills & Practices | Summative Assessments |
|---|---|---|---|
| Systems and Models | The scientific method is a flexible process for asking and answering scientific questions.<br><br>The scientific method begins with observing and questioning phenomena in the natural world. Scientists make careful, detailed, and systematic observations that can serve as data and evidence to support a claim.<br><br>A scientific argument consists of a claim, supporting evidence, and logical reasoning that explains the relationship between the evidence and claim..<br><br>Scientists construct models to study phenomena and processes that are difficult to observe directly. Scientists use models to explain and test ideas and modify their models as they collect/discover more data. | Make detailed and systematic observations and logical inferences about natural phenomena.<br><br>Ask questions that arise from careful observations of phenomena, models, or unexpected results, to clarify results.<br><br>Develop and use models to describe unobservable mechanisms.<br><br>Collect, analyze, and interpret data from investigations.<br><br>Communicate ideas to peers.<br><br>Work in a collaborative, scientific manner.<br><br>Construct a scientific explanation based on evidence. | Digital interactive notebooks that incorporate written statements of observations and inferences and scientific diagrams that serve as models.<br><br>Claim, evidence, reasoning paragraphs explaining observed scientific phenomena. |

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| Variables | Scientific methods involve asking questions, gathering information and observations, formulating hypotheses, designing and conducting investigations, analyzing data and experimental design, and reporting results to the greater community.<br><br>A variable is anything you can change in an experiment that might affect the outcome.<br><br>In a controlled experiment, only the dependent variable is changed and the results are compared to a standard.<br><br>The dependent (experimental) variable is changed incrementally to determine its effect on the independent variable (outcome).<br><br>Multiple trials improve experimental accuracy. | Ask questions that arise from careful observations of phenomena, models, or unexpected results, to clarify results.<br><br>Ask questions to determine the relationships between independent and dependent variables.<br><br>Design and conduct a scientific investigation.<br><br>Collect, analyze, and interpret data from investigations.<br><br>Use data to make predictions.<br><br>Apply mathematics and computational thinking in the context of science.<br><br>Communicate ideas to peers.<br><br>Work in a collaborative, scientific manner.<br><br>Construct a scientific explanation based on evidence. | Digital interactive notebooks that include written observations and inferences, data displays, and scientific diagrams that serve as models.<br><br>Claim, evidence, reasoning paragraphs explaining observed scientific phenomena.<br><br>Controlled experiment using catapult or flier system.<br><br>Controlled experiment using a self-selected system. |

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| Individual Science Project - Controlled Experiment | Scientific investigations are systematic and require clarifying what counts as data and identifying variables.<br><br>Scientific investigations produce data that must be analyzed in order to derive meaning.<br><br>Scientists identify sources of error in their experiments.<br><br>Controlled experiments change only one variable (the independent variable).<br><br>Multiple trials increase validity of the data gathered.<br><br>Data tables and graphs organize results in easy to understand ways.<br><br>Science experiments don't always go as planned.<br><br>Scientists communicate information and ideas in multiple ways: using tables, diagrams, graphs, models, and equations as well as orally, in writing, and through extended discussions.<br><br>In science, reasoning and argument based on evidence are essential to identifying the best explanation. | Ask a question that can be investigated within the scope of the classroom, home, or other facilities with available resources.<br><br>Plan an investigation individually and in the design: identify independent and dependent variables and controls, what tools are needed to gather data, how measurements will be recorded, and how many pieces of data are needed to support a claim.<br><br>Formulate a hypothesis.<br><br>Construct, analyze, and/or interpret graphical displays of data.<br><br>Research and apply an understanding of information related to the identified question.<br><br>Construct an explanation that includes qualitative or quantitative relationships between variables.<br><br>Effectively collaborate with teachers, peers, and test subjects.<br><br>Evaluate the design and implementation of the experiment.<br><br>Construct a visual representation of the experiment.<br><br>Communicate design, procedure, and results of a controlled experiment to peers, teachers, and professionals. | Develop and then follow a protocol for a controlled experiment within a system of the student's choice.<br><br>Science forum project presentation that includes data displays and analysis. |

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| Engineering Design | Engineering questions clarify problems to help determine criteria for successful solutions.<br><br>Engineering investigations identify the effectiveness, efficiency, and durability of designs under different conditions.<br><br>An optimal design depends on how well the proposed solutions meet criteria and constraints.<br><br>Engineers engage in argumentation when testing a design solution. | Define a design problem that can be solved through the development of an object, tool, or process.<br><br>Identify constraints associated with the design problem.<br><br>Identify the criteria for success.<br><br>Brainstorm solutions.<br><br>Select a solution.<br><br>Prototype a selected solution.<br><br>Collect data about the performance of a proposed object, tool, process, or system under a range of conditions.<br><br>Test and evaluate the object, tool, process, or system.<br><br>Improve solution.<br><br>Communicate solution. | Build a satellite challenge.<br><br>Launch a satellite challenge. |

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| Diversity of Life | All organisms exhibit common characteristics and have certain requirements.<br><br>Some organisms can become dormant to survive an unsuitable environment.<br><br>As the power of a microscope increases, its field of view decreases.<br><br>The cell is the basic unit of life.<br><br>All living things are made up of one or more cells.<br><br>Every cell has structures that enable it to carry out life's functions.<br><br>Both single-celled and multicellular organisms exhibit all characteristics of life.<br><br>Cells are made of cell structures, which are made of molecules, which are made of atoms.<br><br>Life is classified into three domains. The various kingdoms of life fit into these three domains. There are currently at least six different kingdoms.<br><br>In a multicellular organism, different types of cells have distinct structures that directly relate to the cell type's function within the body. | Differentiate between living and nonliving things.<br><br>Demonstrate proper use and care of the microscope.<br><br>Prepare dry and wet mount slides.<br><br>Calculate the optical power of a microscope.<br><br>Estimate the size of objects based on measurements of the field of view and the total magnification.<br><br>Use a microscope to observe and compare structures of cells in multicellular and single-celled organisms.<br><br>Draw scale representations of images seen through a microscope.<br><br>Identify structures within cells.<br><br>Relate the structure and function of cells, tissues, organs, systems, and organisms in animals and plants.<br><br>Classify organisms by domains and kingdoms.<br>Collect, analyze, and interpret data from investigations.<br><br>Construct explanations and arguments based on observational data. | Digital interactive notebooks.<br><br>Lab practical - Creating slides and using the Microscope.<br><br>Multicellular vs single-celled organism response sheet.<br><br>Model cell and organelle project.<br><br>Field notebook from Watson Homestead. |