ANKENY
COMMUNITY SCHOOL DISTRICT

Department of Academic Services

K-12 Science Curriculum Review

June, 2019
(Board approved 2019)

Science Mission Statement

The mission statement was written collaboratively by representatives of Science teachers, Instructional Coaches and Administrators. The mission statement is a commitment by teachers across the district ensuring a guaranteed and viable curriculum.

Students will engage collaboratively through evidence-based inquiry processes and scientific discourse to become responsible, scientifically literate citizens.

Science Pathways

Science Pathway Offerings - A Guide for Parents and Students

This document will assist in decision-making for parents and students as they plan their educational pathway in the area of Science.

Ankeny Science Graduation Requirements and Iowa's Science Requirements

All students will successfully complete 3 years of science education to include the standard areas of earth, space, biology, chemistry and physics.

Ankeny has two pathways to fulfill the necessary district, state and college entry requirements. Both pathways provide a rich science experience for all students regardless of their career goals.

1. **Science Essentials Pathway**
    - College or career preparation in any content area is the goal. Students will find this pathway provides rigorous experiences related to the science grade level standards. Students will have the necessary preparation to be successful when they begin post-secondary coursework.
    - The Science Essential Pathway does not exclude any student from taking an Advanced Placement (AP) course. However, if the goal is to enroll in advanced placement (AP) course to earn college credit, students should consider the Enriched Science Pathway to maximize the chances of successful completion of those courses.
2. **Enriched Science Pathway**
    - The goal of the Enriched Science Pathway is to deepen the experiences of the science grade level standards. Moving at a faster pace through basic and foundational concepts/skills provides students the opportunity to move beyond the minimum expectations of the grade level standards and explore topics in-depth. While the grade level standards are grounded in the same concepts and skills regardless of the pathway, the Enriched Science Pathway dives more deeply into the subject material.
    - College or career preparation in any content area is the goal. Students will find this pathway provides rigorous experiences related to the science grade level standards. Students will have the necessary preparation to be successful when they begin post-secondary coursework.
3. **Pathway Flexibility**
    - Students are initially placed during eighth and ninth grade in a pathway based on requirements of readiness and probability of success. This is due to the faster pace and deeper exploration of the grade level standard concepts/skills in the Enriched Science Pathway.
    - Once in high school, if a student finds their interests have changed or they have completed the science essentials coursework with a high degree of success, they may consider enrolling in an Enriched Science course.

        If, for any reason a student has found they are not being successful – or they are not being individually challenged – students could be enrolled in an alternate pathway at the end of a semester during their eighth or ninth grade year.

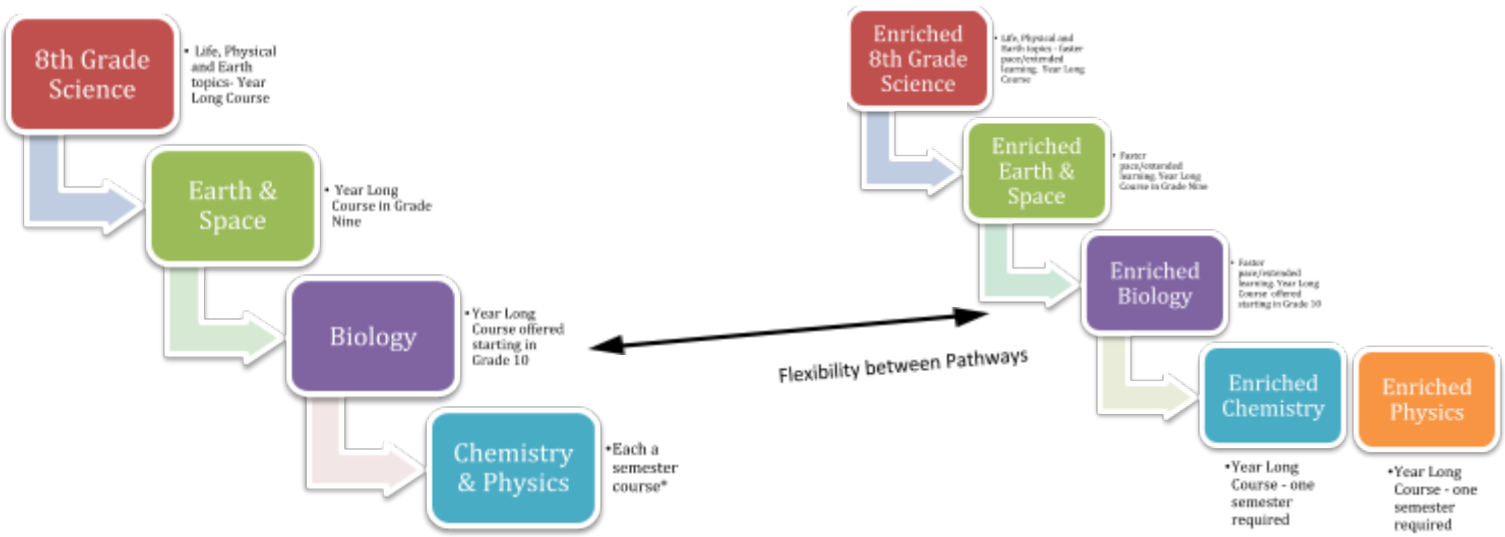
Pathway Considerations:

- District requires 6 units (3 courses) of Science for Graduation
- The state (Chapter 12) requires all students successfully complete 3 years of science education to include the standard areas of earth, space, biology, chemistry and physics. This requirement will begin with this year's eighth grade class and exempt this year's ninth, tenth, eleventh and twelfth grade students.

- The Science Essential Pathway will enable students to meet both district and state requirements in three years of study.
- The Enriched Science Pathway will enable students to meet both district and state requirements in three years of science study as well.
    - Students may enroll in two science courses simultaneously if they are interested in pursuing additional science courses beyond the required coursework. Prerequisites will apply.

**Students are encouraged to look at individual college entrance requirements when choosing a pathway as well as when choosing elective courses.

Science Essentials Pathway – 3 Years **Enriched Science Pathway – 3 or 4 Years**



**Be sure to check college entrance requirements when choosing pathways.*

Science Electives and Prerequisites

Science course options are available matching individual student interests. Some electives include opportunities that potentially earn college level credit. These courses do not fulfill graduation and state requirements for science and are considered additional learning opportunities for students beyond the pathway options. In addition, some science courses require a foundational course prior to enrollment.

Electives

-Anatomy & Physiology
-Astronomy
-Geology
-AP Environmental
-AP Biology and
-AP Chemistry
AP
-AP Physics
-Enriched Biology and/or Enriched Chemistry may be taken simultaneously with AP Environmental Science

Prerequisites *(not all prerequisites may be listed - please consult the course handbook)*

Earth and Space (Essentials or Enriched) is required to take Biology, Geology or Astronomy
-Biology is required to take Chemistry, Physics, Anatomy & Physiology or AP Environmental Science
-Chemistry is not required to take Physics
Science-Enriched Biology and Enriched Chemistry may be taken simultaneously
-Enriched Physics and Enriched Chemistry may be taken simultaneously
-Biology, Chemistry & Physics Essentials, Enriched Chemistry, or Enriched Physics is required to take

Course Purposes

The following course purposes describe what students will know and demonstrate by the end of the grade or course. Each Grade Level Standard and the Components directly align to this statement, or promise, regarding the guaranteed and viable curriculum.

Kindergarten

Students will demonstrate an understanding of; pushes and pulls, local weather patterns, and what living things need and how they interact with their environment. They will accomplish this by asking questions and defining problems, developing and using models, analyzing and interpreting data, and obtaining and communicating information.

1st Grade

Students will demonstrate an understanding of; light and sound waves, characteristics and traits of living things to survive, earth's patterns of the sun, moon and stars and engineering and design process. Students will accomplish this by making observations, planning and carrying out investigations, asking questions, and interpreting data.

2nd Grade

Students will develop an understanding of; properties/phases of materials, plant growth and reproduction, diversity of habitats, fast and slow earth changes and engineering/design processes. Students will accomplish this by planning and conducting investigations, developing models, asking questions and making observations, analyzing and comparing data.

3rd Grade

Students will be empowered to observe natural phenomenon through investigations in; plant and animal survival and adaptations, traits and heredity, forces and motion, weather, climate and human interactions and engineering and design. Students will accomplish this by planning and conducting investigations, developing models, asking questions and making observations, analyzing and comparing data.

4th Grade

Students will, through science and engineering practices, develop models, design solutions, and construct explanations to demonstrate their understanding of energy transfer, changes, and conversions, waves and their uses, changes in the Earth and plant and animal structures and response to the environment.

5th Grade

Students will, through science and engineering practices, demonstrate a scientific understanding regarding; properties of matter, Earth's systems, Earth's place in the universe (sun and stars, resources, Earth and solar system) and energy in everyday life.

6th Grade

Students will develop skills in critical thinking and mental flexibility in the areas of physical, life and earth science to engage in real-life application and make informed, evidence-based decisions.

7th Grade

Students will collaboratively explore phenomena by solving problems about the natural world and understand the changing nature of scientific inquiry. Students will become ecologically responsible individuals able to differentiate evidence-based fact from opinion and communicate understandings.

8th Grade

Students will be able to describe and explain how changes occur within Earth's life forms and systems. The changes students explore will include Newton's Laws, natural selection, biodiversity, weather, and wave interactions. As

science students explore these changes, they will engage in scientific processes such as modeling, designing, predicting, analyzing, and evaluating to become scientifically literate citizens.

8th Grade Enriched

S*tudents will experience a faster paced, more in-depth study of the curriculum. Students will independently apply their learning to novel situations about how changes occur within Earth's life forms and systems. The changes students explore will include Newton's Laws, natural selection, biodiversity, weather, and wave interactions. As science students explore these changes, they will engage in scientific processes such as modeling, designing, predicting, analyzing, and evaluating to become scientifically literate citizens. This course will help prepare students for the Enriched pathway in high school and AP level courses.*

Earth/Space

Students will explore how the Earth works as a system, how the Earth connects to the universe, and how both have changed and will continue to change over time. In this process, students will engage collaboratively through evidence-based inquiry processes and scientific discourse to become responsible, scientifically literate citizens. This course is included in the Essentials pathway, which meets all graduation requirements and college entrance requirements.

Earth/Space Enriched

Students will engage in in-depth explorations of how the Earth works as a system, how the Earth connects to the universe, and how both have changed and will continue to change over time. In this process, students will engage collaboratively through evidence-based inquiry processes and scientific discourse to become responsible, scientifically literate citizens. This course is included in the Enriched pathway and supports preparation for AP level courses.

Biology

Students will engage in science practices to understand and apply principles related to homeostasis, ecosystems, heredity, and evolution.

Biology Enriched

Students will engage in science practices to understand and apply principles related to homeostasis, ecosystems, heredity, and evolution.

Chemistry

Students will develop an understanding of how the structure of a substance influences its physical and chemical properties. Topics will be investigated using an inquiry approach to problem solving, through lab experiences, engineering design processes, and mathematical modeling. Students will engage in scientific discourse to share, confirm, and challenge ideas.

Chemistry Enriched

Students will develop an understanding of how the structure of a substance influences its physical and chemical properties. Topics will be investigated using an inquiry approach to problem solving, through lab experiences, engineering design processes, and mathematical modeling. Students will engage in scientific discourse to share, confirm, and challenge ideas.

Physics

Students will develop an understanding of the physical world around them. Topics will be investigated using an inquiry approach to problem solving, through lab experiences, engineering design processes, and mathematical modeling. Students will engage in scientific discourse to share, confirm, and challenge ideas.

Physics Enriched

Students will conceptually describe motion of objects or particles using forces, work and energy, and momentum, electricity and waves. Students will investigate topics using an inquiry approach to problem solving, through lab experiences, engineering design processes, and mathematical modeling.

Anatomy and Physiology

Students will conduct an in-depth study of the structures and functions of the mammalian body. This course explores interrelationships of body systems with an emphasis on skeletal, muscular, circulatory, respiratory, digestive, integumentary, nervous, and endocrine systems. Students will further their science literacy skills through dissection, laboratory experiences, and clinical studies. The material learned in this course can be applied to medical field careers, health and fitness careers, and biological research careers.

AP Chemistry

Students will understand and apply chemistry topics that include: atomic structure and properties, molecular and ionic compound structure and properties, intermolecular forces, chemical reactions, kinetics, thermodynamics, equilibrium, acids and bases, and applications of thermodynamics.

AP Physics

Students will investigate topics in kinematics, dynamics, energy, momentum, rotation, gravitation and oscillation

AP Biology

Students will understand and apply concepts to include Biochemistry, Cells, Energetics, Heredity, Molecular Biology, Evolution, Diversity, Plant Structure and Function, and Animal Structure and Function.

AP Environmental Science

Students will engage in science practices to understand and apply principles related to sustainability, ecology, energy, and pollution; to understand processes and interrelationships within the natural world; and to identify and analyze environmental problems.

Grade Level Standards and Components

The Grade Level Standards and Components represent the guaranteed and viable curriculum for all students in Ankeny. Prioritized through a collaborative process, the Grade Level Standards and Components represent the most critical concepts and skills required to be successful learners in school and beyond high school.

The code in parentheses represents the standards from the Iowa Core Science Standards - the original document used for the prioritization process. Any Grade Level Standard (Bold and Underlined) labeled as a "Focus" area will have evidence in Infinite Campus' gradebook and student performance will be reported in Infinite Campus. Those Grade Level Standards are the most critical to student success and, as a result, have been designated as focus areas.

Those Grade Level Standards (Bold and underlined) labeled as "Foundational" or "Introductory" have been designated as agreed upon areas for instruction, but will not have performance reported in Infinite Campus or on a report card. The difference between the levels is the amount of direct instruction and/or experiences students have with the skill during that grade or course.

Any Components (not bold or underlined) under the Grade Level Standard labeled as "Focus" are the critical formative skills required to demonstrate the Grade Level Standard and evidence of learning will be recorded in Infinite Campus. The preponderance of evidence on each Grade Level Standard will determine the performance level on each Grade Level Standard.

The prioritization process allows teachers to target instruction on the skills required for that grade or course. This allows students to focus on only a few grade level standards and dive deeper into the learning. By having multiple and varied opportunities to demonstrate their learning, reporting on the performance of grade level standards is more accurate.

Kindergarten

Grade Level Purpose

Students will demonstrate an understanding of; pushes and pulls, local weather patterns, and what living things need and how they interact with their environment. They will accomplish this by asking questions and defining problems, developing and using models, analyzing and interpreting data, and obtaining and communicating information.

Grade Level Standards and Components

SCI.K.01 Analyze data to compare the effects of pushes and pulls on an object.

SCI.K.01.01 Students will plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. (K-PS2-1) (Focus)
SCI.K.01.02 Students will analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. (K-PS2-2) (Foundational)
SCI.K.01.03 Students will ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) (Introductory)
SCI.K.01.04 Students will develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) (Introductory)
SCI.K.01.05 Students will analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses. (K-2-ETS1-3) (Introductory)

SCI.K.02 Demonstrate understanding of local weather patterns.

SCI.K.02.01 Students will use and share observations of local weather conditions to describe patterns over time. (K-ESS2-1) (Focus)
SCI.K.02.02 Students will make observations to determine the effect of sunlight on Earth's surface. (K-PS3-1) (Foundational)
SCI.K.02.03 Students will use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface. (K-PS3-2) (Foundational)
SCI.K.02.04 Students will ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. (K-ESS3-2) (Introductory)
SCI.K.02.05 Students will ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) (Introductory)
SCI.K.02.06 Students will develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) (Introductory)
SCI.K.02.07 Students will analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses. (K-2-ETS1-3) (Introductory)

SCI.K.03 Determine the basic needs of plants and animals and how they relate to their environments.

SCI.K.03.01 Students will use observations to describe patterns of what plants and animals (including humans) need to survive. (K-LS1-1) (Focus)
SCI.K.03.02 Students will construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. (K-ESS2-2) (Focus)
SCI.K.03.03 Students will use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. (K-ESS3-1) (Focus)
SCI.K.03.04 Students will communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. (K-ESS3-3) (Foundational)

SCI.K.03.05 Students will ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) (Introductory)
SCI.K.03.06 Students will develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) (Introductory)
SCI.K.03.07 Students will analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses. (K-2-ETS1-3) (Introductory)

1st Grade

Course Purpose

Students will demonstrate an understanding of; light and sound waves, characteristics and traits of living things to survive, earth's patterns of the sun, moon and stars and engineering and design process. Students will accomplish this by making observations, planning and carrying out investigations, asking questions, and interpreting data.

Grade Level Standards and Components

SCI.01.01 Analyze and predict patterns of the sun, moon, and stars

SCI.01.01.01 Students will make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2) (Focus)
SCI.01.01.02 Students will use Observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1) (Foundational)
SCI.01.01.03 Students will ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) (Foundational)
SCI.01.01.04 Students will develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) (Foundational)
SCI.01.01.05 Students will analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each preforms. (K-2-ETS1-3) (Foundational)

SCI.01.02 Explains the relationship between objects, light, and sound waves and apply how they can be used to communicate.

SCI.01.02.01 Students will make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2) (Focus)
SCI.01.02.02 Students will plan and conduct investigations to determine the effect of placing objects made with different materials. (1-PS4-3) (Focus)
SCI.01.02.03 Students will use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4) (Focus)
SCI.01.02.04 Students will make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2) (Focus)
SCI.01.02.05 Students will ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) (Foundational)
SCI.01.02.06 Students will develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) (Foundational)
SCI.01.02.07 Students will analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each preforms. (K-2-ETS1-3) (Foundational)
SCI.01.02.08 Students will plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials (1-PS4-1) (Introductory)

SCI.01.03 Use the patterns and behaviors of living things to solve problems.

SCI.01.03.01 Students will use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. (1-LS1-1) (Focus)
SCI.01.03.02 Students will read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. (1-LS1-2) (Focus)
SCI. 01.03.03 Students will make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. (1-LS3-1) (Focus)

SCI.01.03.04 Students will make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2) (Focus)
SCI.01.03.05 Students will ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) (Foundational)
SCI.01.03.06 Students will develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) (Foundational)
SCI.01.03.07 Students will analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3) (Foundational)

2nd Grade

Course Purpose

Students will develop an understanding of; properties/phases of materials, plant growth and reproduction, diversity of habitats, fast and slow earth changes and engineering/design processes. Students will accomplish this by planning and conducting investigations, developing models, asking questions and making observations, analyzing and comparing data

Grade Level Standards and Components

SCI.02.01 Determine the effect wind and water have on Earth events.

SCI.02.01.01 Students will use information from several sources to provide evidence that Earth events can occur quickly or slowly. (2-ESS1-1) (Focus)
SCI.02.01.02 Students will compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. (2-ESS2-1) (Focus)
SCI.02.01.03 Students will construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. (2-PS1-4) (Focus)
SCI.02.01.04 Students will develop a model to represent the shapes and kinds of land and bodies of water in an area. (2-ESS2-2) (Foundational)
SCI.02.01.05 Students will obtain information to identify where water is found on Earth and that it can be solid or liquid. (2-ESS2-3) (Foundational)
SCI.02.01.06 Students will ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) (Foundational)
SCI.02.01.07 Students will develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) (Foundational)
SCI.02.01.08 Students will analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3) (Foundational)

SCI.02.02 Analyze matter and determine the best material to use for solving a problem.

SCI.02.02.01 Students will plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. (2-PS1-1) (Focus)
SCI.02.02.02 Students will analyze data obtained from testing different materials to determine which materials have the properties that are best suited for the intended purpose. (2-PS1-2) (Focus)
SCI.02.02.03 Students will make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. (2-PS1-3) (Foundational)
SCI.02.02.04 Students will ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) (Foundational)
SCI.02.02.05 Students will develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) (Foundational)
SCI.02.02.06 Students will analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3) (Foundational)

SCI.02.03 Explain different conditions that affect the survival of plants and animals.

SCI.02.03.01 Students will plan and conduct an investigation to determine if plants need sunlight and water to grow. (2-LS2-1) (Focus)
SCI.02.03.02 Students will make observations of plants and animals to compare the diversity of life in different habitats. (2-LS4-1) (Focus)
SCI.02.03.03 Students will ask questions, make observations, and gather information about a situation

people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) (Focus)
SCI.02.03.04 Students will develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2) (Focus)
SCI.02.03.05 Students will analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses o f how each performs. (K-2-ETS1-3) (Focus)
SCI.02.03.06 Students will develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. (2-LS2-2) (Foundational)
SCI.02.03.07 Students will obtain information to identify where water is found on Earth and that it can be solid or liquid. (2-ESS2-3) (Foundational)

3rd Grade

Course Purpose

Students will be empowered to observe natural phenomenon through investigations in; plant and animal survival and adaptations, traits and heredity, forces and motion, weather, climate and human interactions and engineering and design. Students will accomplish this by planning and conducting investigations, developing models, asking questions and making observations, analyzing and comparing data.

Grade Level Standards and Components

SCI.03.01 Analyze the relationship between objects when they interact and move.

SCI.03.01.01 Students will make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. (3-PS2-2) (Focus)
SCI.03.01.02 Students will ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. (3-PS2-3) (Focus)
SCI.03.01.03 Students will define a simple design problem that can be solved by applying scientific ideas about magnets. (3-PS2-4) (Focus)
SCI.03.01.04 Students will represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (3-ESS2-1) (Focus)
SCI.03.01.05 Students will plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. (3-PS2-1) (Foundational)
SCI.03.01.06 Students will define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5 ETS1-1) (Introductory)
SCI.03.01.07 Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5 ETS1-2) (Introductory)
SCI.03.01.08 Students will 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. (3-5 ETS1-3) (Introductory)

SCI.03.02 Evaluates similarities and differences between organisms.

SCI.03.02.01 Students will develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.(3-LS1-1) (Focus)
SCI.03.02.02 Students will analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. (3-LS3-1) (Focus)
SCI.03.02.03 Students will use evidence to support the explanation that traits can be influenced by the environment. (3-LS3-2) (Focus)
SCI.03.02.04 Students will analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. (3-LS4-1) (Focus)
SCI.03.02.05 Students will represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (3-ESS2-1) (Focus)
SCI.03.02.06 Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5 ETS1-2) (Introductory)

SCI.03.03 Determine how various factors affect the survival of organisms.

SCI.03.03.01 Students will use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (3-LS4-2) (Focus)
SCI.03.03.02 Students will represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (3-ESS2-1) (Focus)

SCI.03.03.03 Students will use evidence to support the explanation that traits can be influenced by the environment. (3-LS3-2) (Focus)
SCI.03.03.04 Students will construct an argument that some animals form groups that help members survive. (3-LS2-1) (Foundational)
SCI.03.03.05 Students will construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. (3-LS4-3) (Foundational)
SCI.03.03.06 Students will make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. (3-LS4-4) (Foundational)
SCI.03.03.07 Students will define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5 ETS1-1) (Introductory)

SCI.03.04 Identify and evaluate different climate and weather patterns/hazards.
SCI.03.04.01 Students will obtain and combine information to describe climates in different regions of the world. (3-ESS2-2) (Focus)
SCI.03.04.02 Students will represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (3-ESS2-1) (Focus)
SCI.03.04.03 Students will make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. (3-ESS3-1) (Foundational)
SCI.03.04.04 Students will define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5 ETS1-1) (Foundational)
SCI.03.04.05 Students will 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. (3-5 ETS1-3) (Foundational)

4th Grade

Course Purpose

Students will, through science and engineering practices, develop models, design solutions, and construct explanations to demonstrate their understanding of energy transfer, changes, and conversions, waves and their uses, changes in the Earth and plant and animal structures and response to the environment.

Grade Level Standards and Components

SCI.04.01 Generate explanations of how earth's features change over time and their impact on humans through the evidence of weathering, erosion, fossils, and rock formations.

SCI.04.01.01 Students will identify evidence from patterns in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for changes in a landscape over time. (4-ESS1-1) (Focus)
SCI.04.01.02 Students will make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. (4-ESS2-1) (Focus)
SCI.04.01.03 Students will analyze and interpret data from maps to describe patterns of Earth's features. (4 ESS2-2) (Foundational)
SCI.04.01.04 Students will define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) (Foundational)
SCI.04.01.05 Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5 ETS1-2) (Foundational)
SCI.04.01.06 Students will generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. (4-ESS3-2) (Foundational)

SCI.04.02 Use observations to explain how energy is changed and transferred.

SCI.04.02.01 Students will use evidence to construct an explanation relating the speed of an object to the energy of that object. (4-PS3-1) (Focus)
SCI.04.02.02 Students will make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (4-PS3-2) (Focus)
SCI.04.02.03 Students will ask questions and predict outcomes about the changes in energy that occur when objects collide. (4-PS3-3) (Focus)
SCI.04.02.04 Students will develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. (4-PS4-1) (Focus)
SCI.04.02.05 Students will obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. (4-ESS3-1) (Foundational)
SCI.04.02.06 Students will define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost. (3-5 ETS1-1) (Foundational)
SCI.04.02.07 Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5 ETS1-2) (Foundational)
SCI.04.02.08 Students will apply scientific ideas to design, test, and refine a device that converts energy from one form to another. (4-PS3-4) (Introductory)

SCI.04.03 Evaluate how the structures of living things have functions that aid in their overall survival.

SCI.04.03.01 Students will construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (4-LS1-1) (Focus)
SCI.04.03.02 Students will use a model to describe that animals receive different types of information

through their senses, process the information in their brain, and respond to the information in different ways. (4-LS1-2) (Focus)
SCI.04.03.03 Students will define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost. (3-5 ETS1-1) (Foundational)
SCI.04.03.04 Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5 ETS1-2) (Foundational)
SCI.04.03.05 Students will generate and compare multiple solutions that use patterns to transfer information. (4-PS4-3) (Introductory)
SCI.04.03.06 Students will develop a model to describe that light reflecting from objects and entering the eye. (4-PS4-2) (Introductory)

5th Grade

Course Purpose

Students will, through science and engineering practices, demonstrate a scientific understanding regarding; properties of matter, Earth's systems, Earth's place in the universe (sun and stars, resources, Earth and solar system) and energy in everyday life.

Grade Level Standards and Components

SCI.05.01 Represent data to support an argument about Earth's place in our universe.

SCI.05.01.01 Students will support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth. (5-ESS1-1) (Focus)
SCI.05.01.02 Students will represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. (5-ESS1-2) (Focus)
SCI.05.01.03 Students will obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (5-ESS3-1) (Foundational)
SCI.05.01.04 Students will define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) (Foundational)
SCI.05.01.05 Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5-ETS1-2) (Foundational)
SCI.05.01.06 Students will 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. (3-5-ETS1-3) (Foundational)

SCI.05.02 Investigate and conclude how matter interacts.

SCI.05.02.01 Students will develop a model to describe that matter is made of particles too small to be seen. (5-PS1-1) (Focus)
SCI.05.02.02 Students will measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. (5-PS1-2) (Focus)
SCI.05.02.03 Students will make observations and measurements to identify materials based on their properties. (5-PS1-3) (Focus)
SCI.05.02.04 Students will conduct an investigation to determine whether the mixing of two or more substances results in new substances. (5-PS1-4) (Focus)
SCI.05.02.05 Students will define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) (Foundational)
SCI.05.02.06 Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. 3-5-ETS1-2 (Foundational)
SCI.05.02.07 Students will 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. (3-5-ETS1-3) (Foundational)

SCI.05.03 Gather information and draw conclusions about how Earth's systems affect one another

SCI.05.03.01 Students will develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. (5-ESS2-1) (Focus)
SCI.05.03.02 Students will describe and graph the amounts of saltwater and freshwater in various reservoirs to provide evidence about the distribution of water on Earth. (5-ESS2-2) (Focus)

SCI.05.03.03 Students will obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (5-ESS3-1) (Foundational)
SCI.05.03.04 Students will define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) (Foundational)
SCI.05.03.05 Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5-ETS1-2) (Foundational)
SCI.05.03.06 Students will 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. (3-5-ETS1-3) (Foundational)

SCI.05.04 Develop a model that shows how energy and matter flow in living organisms.

SCI.05.04.01 Students will use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. (5-PS3-1) (Focus)
SCI.05.04.02 Students will develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (5-LS2-1) (Focus)
SCI.05.04.03 Students will support an argument that plants get the materials they need for growth chiefly from air and water. (5-LS1-1) (Foundational)
SCI.05.04.04 Students will define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) (Foundational)
SCI.05.04.05 Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5-ETS1-2) (Foundational)
SCI.05.04.06 Students will 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. (3-5-ETS1-3) (Foundational)

6th Grade

Course Purpose

Students will develop skills in critical thinking and mental flexibility in the areas of physical, life and earth science to engage in real-life application and make informed, evidence-based decisions.

Grade Level Standards and Components

SCI.06.01 Students will develop models of how atoms create molecules and how they are altered by physical and chemical changes. (Focus)

SCI.06.01.01 Students will develop models to describe the atomic composition of simple molecules and extended structures.MS-PS1-1. (Focus)
SCI.06.01.02 Students will analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. MS-PS1-2 (Focus)
SCI.06.01.03 Students will develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. MS-PS1-4. (Focus)
SCI.06.01.04 Students will develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.MS-PS1-5. (Foundational)
SCI.06.01.05 Students will undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. (Introductory) MS-PS1-6

SCI.06.02 Students will construct an explanation about how features on the Earth's surface are constantly changed by a combination of slow and rapid processes including weathering, erosion, volcanoes, mountain formation, and earthquakes. (Focus)

SCI.06.02.01 Students will develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. MS-ESS2-1 (Focus)
SCI.06.02.02 Students will construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. MS-ESS2-2 (Focus)
SCI.06.02.03 Students will 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 (Focus)

SCI.06.03 Students will develop models of cells, show how cells make up organs and living things, and construct an explanation showing why some organisms have identical offspring, while others exhibit genetic variation. (Focus)

SCI.06.03.01 Students will conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.MS-LS1-1. (Focus)
SCI.06.03.02 Students will develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. MS-LS1-2 (Focus)
SCI.06.03.03 Students will use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.MS-LS1-3 (Focus)
SCI.06.03.04 Students will develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction result in offspring with genetic variation. MS-LS3-2. (Focus)
SCI.06.03.05 Students will gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. MS-LS1-8 (Introductory)

SCI.06.04 Students will analyze the distribution of resources and construct explanations to develop technologies to help in forecast future catastrophes. (Introductory)

SCI.06.04.01 Students will construct a scientific explanation based on evidence for how the uneven

distribution of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. MS-ESS3-1. (Introductory)
SCI.06.04.01 Students will analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. MS-ESS3-**2.** (Introductory)

SCI.06.05 Students will use the Engineering Design Processes to investigate problems. (Introductory)

SCI.06.05.01 Students will 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.(Introductory)
SCI.06.05.01 Students will evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.MS-ETS1-2. (Introductory)
SCI.06.05.01 Students will 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.(Introductory)
SCI.06.05.01 Students will 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 (Introductory)

7th Grade

Course Purpose

Students will collaboratively explore phenomena by solving problems about the natural world and understand the changing nature of scientific inquiry. Students will become ecologically responsible individuals able to differentiate evidence-based fact from opinion and communicate understandings.

Grade Level Standards and Components

SCI.07.01 Students will develop, construct and describe a model based on evidence to explain the relationship between photosynthesis and the flow of energy and the cycling of matter. (Focus)

SCI. 07.01.01 Students will construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. (MS-LS1-6) See also MS-LS2-3 (Focus)
SCI.07.01.02 Students will develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.(MS-LS1-7) (Focus)
SCI.07.01..03 Students will construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.(MS-LS1-5) (Foundational)
SCI.07.01.04 Students will use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. (MS-LS1-4) (Introductory)

SCI.07.02 Students will determine criteria and constraints of engineering design problems and use a systematic process to evaluate solutions. (Focus)

SCI.07.02.01 Students will 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) (Focus)
SCI.07.02.02 Students will evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2) (Foundational)
SCI.07.02.03 Students will 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) (Foundational)

SCI. 07.03 Students will ask questions about data to determine factors that affect the strength of electric and magnetic forces. (Focus)

SCI. 07.03.01 Students will ask questions about data to determine the factors that affect the strength of electric and magnetic forces.(MS-PS2-3.) (Focus)
SCI. 07.03.02 Students will construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.(MS-PS2-4.) (Foundational)
SCI.07.03.03 Students will conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.(MS-PS2-5.) (Introductory)

SCI.07.04 Students will investigate and describe the relationship between potential and kinetic energy and the forces applied on objects or particles and determine how the energy is stored or transferred. (Focus)

SCI.07.04.01 Students will develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. (MS-PS3-2) (Focus)
SCI. 07.04.02 Students will plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.(MS-PS3-4.) (Focus)
SCI.07.04.03 Students will construct, use, and present arguments to support the claim that when the kinetic energy

of an object changes, energy is transferred to or from the object.(MS-PS3-5). (Introductory)

SCI.07.05 Students will develop a model and describe patterns using the parts of the solar system (Focus)

SCI.07.05.01 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. (MS-ESS1-1.) (Focus)
SCI.07.05.03 Analyze and interpret data to determine scale properties of objects in the solar system. (MS-ESS1-3.) (Foundational)
SCI.07.05.04 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system (MS-ESS1-2.) (Introductory)

SCI.07.06 Students will construct explanations based on evidence about matter and energy resource availability to individual organisms, populations and ecosystems. (Focus)

SCI.07.06.01 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.) (Focus)
SCI.07.06.02 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (MS-LS2-2.) (Focus)
SCI.07.06.03 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (MS-LS2-3.) See also MS-LS1-6. (Focus)
SCI.07.06.04 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.(MS-LS2-4.) (Introductory)
SCI. 07.05.02 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.(MS-ESS1-4.) (Introductory)

SCI.07.07 Students will describe how DNA mutations may be beneficial, harmful or neutral to the structure and function of an organism. (Foundational)

SCI.07.07.01 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.MS-LS3-1. (DNA Structure and function needed to even begin to understand this) (Foundational)

8th Grade

Course Purpose

Students will be able to describe and explain how changes occur within Earth's life forms and systems. The changes students explore will include Newton's Laws, natural selection, biodiversity, weather, and wave interactions. As science students explore these changes, they will engage in scientific processes such as modeling, designing, predicting, analyzing, and evaluating to become scientifically literate citizens.

Grade Level Standards and Components

SCI.08.01 Students will research and analyze information to determine how synthetic materials are formed. (Focus)

SCI.08.02.01 Students will 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-ESS 2-4) (Focus)
SCI.08.02.02 Students will collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. (MS-ESS 2-5) (Focus)
SCI.08.02.03 Students will develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. (MS-ESS 2-6) (Foundational)

SCI.08.03 Students will design and evaluate ways to minimize and monitor human impact on Earth's systems. (Focus)

SCI.08.03.01 Students will apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (MS-ESS 3-3) (Focus)
SCI.08.03.02 Students will construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems. (MS-ESS 3-4) (Foundational)
SCI.08.03.03 Students will ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. (MS-ESS 3-5) (Introductory)

SCI.08.04 Students will engage in the engineering design process. (Focus)

SCI.08.04.01 Students will 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 - ETS 1-1) (Engineering) (Focus)
SCI.08.04.02 Students will evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS 1-2) (Engineering) (Focus)
SCI.08.04.03 Students will analyze data from text 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) (Engineering) (Focus)
SCI.08.04.04 Students will develop a model to generate data for iterative testing and modification for a proposed object, tool, or process such that an optimal design can be achieved. (MS-ETS1-4) (Engineering) (Focus)

SCI.08.05 Students will use balanced and unbalanced forces and action reaction pairs to predict the motion of objects involved in interactions. (Focus)

SCI.08.05.01 Students will plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. (MS-PS 2-2) (Focus)
SCI.08.05.02 Students will apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. (MS-PS 2-1) (Focus)
SCI.08.05.03 Students will construct and interpret graphical displays of data to describe the relationships of Kinetic Energy to the mass of an object and to the speed of an object. (MS-PS 3-1. (Foundational)

SCI.08.06 Students will evaluate different ways to determine and protect biodiversity and ecosystems services. (Focus)

SCI.08.06 Students will evaluate competing design solutions for maintaining biodiversity and ecosystem services. (MS-LS 2-5) (Focus)

SCI.08.07 Students will analyze and interpret models of waves and determine how sound and light waves interact with different mediums. (Focus)

SCI.08.07.01 Students will use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. (MS-PS 4-1 Waves)

SCI.08.07.02 Students will develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. (MS-PS 4-2 Waves)

SCI.08.07.03 Students will integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. (MS-PS 4-3) (Introductory)

SCI.08.08 Students will explain the process of species changing through natural selection by interpreting the fossil record and using genetic and mathematical evidence. (Focus)

SCI.08.08.01 Students will analyze and interpret data for patterns in the fossil record that documents the existence, diversity, extinction, and change of lifeforms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. (MS-LS 4-1) (Focus)

SCI.08.08.02 Students will construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. (MS-LS 4-4) (Focus)

SCI.08.08.03 Students will use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. (MS LS 4-6) (Focus)

SCI.08.08.04 Students will apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. (MS-LS 4-2) (Foundational)

SCI.08.08.06

Students will gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (MS-LS 4-5) (Introductory)

SCI.08.09 Students will follow the engineering process to develop a device to minimize or maximize thermal energy transfer. (Foundational)

SCI.08.09.01 Students will apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (MS-PS 3-3 Energy) (Foundational)

8th Grade Enriched

Course Purpose

Students will experience a faster paced, more in-depth study of the curriculum. Students will independently apply their learning to novel situations about how changes occur within Earth's life forms and systems. The changes students explore will include Newton's Laws, natural selection, biodiversity, weather, and wave interactions. As science students explore these changes, they will engage in scientific processes such as modeling, designing, predicting, analyzing, and evaluating to become scientifically literate citizens. This course will help prepare students for the Enriched pathway in high school and AP level courses.

Grade Level Standards and Components

SCI.08.01 Students will research and analyze information to determine how synthetic materials are formed. (Focus)

SCI.08.02.01 Students will 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-ESS 2-4) (Focus)
SCI.08.02.02 Students will collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. (MS-ESS 2-5) (Focus)
SCI.08.02.03 Students will develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. (MS-ESS 2-6) (Foundational)

SCI.08.03 Students will design and evaluate ways to minimize and monitor human impact on Earth's systems. (Focus)

SCI.08.03.01 Students will apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (MS-ESS 3-3) (Focus)
SCI.08.03.02 Students will construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems. (MS-ESS 3-4) (Foundational)
SCI.08.03.03 Students will ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. (MS-ESS 3-5) (Introductory)

SCI.08.04 Students will engage in the engineering design process. (Focus)

SCI.08.04.01 Students will 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 - ETS 1-1) (Engineering) (Focus)
SCI.08.04.02 Students will evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS 1-2) (Engineering) (Focus)
SCI.08.04.03 Students will analyze data from text 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) (Engineering) (Focus)
SCI.08.04.04 Students will develop a model to generate data for iterative testing and modification for a proposed object, tool, or process such that an optimal design can be achieved. (MS-ETS1-4) (Engineering) (Focus)

SCI.08.05 Students will use balanced and unbalanced forces and action reaction pairs to predict the motion of objects involved in interactions. (Focus)

SCI.08.05.01 Students will plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. (MS-PS 2-2) (Focus)
SCI.08.05.02 Students will apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. (MS-PS 2-1) (Focus)
SCI.08.05.03 Students will construct and interpret graphical displays of data to describe the relationships of Kinetic Energy to the mass of an object and to the speed of an object. (MS-PS 3-1. (Foundational)

SCI.08.06 Students will evaluate different ways to determine and protect biodiversity and ecosystems services. (Focus)

SCI.08.06 Students will evaluate competing design solutions for maintaining biodiversity and ecosystem services. (MS-LS 2-5) (Focus)

SCI.08.07 Students will analyze and interpret models of waves and determine how sound and light waves interact with different mediums. (Focus)

SCI.08.07.01 Students will use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. (MS-PS 4-1 Waves)

SCI.08.07.02 Students will develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. (MS-PS 4-2 Waves)

SCI.08.07.03 Students will integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. (MS-PS 4-3) (Introductory)

SCI.08.08 Students will explain the process of species changing through natural selection by interpreting the fossil record and using genetic and mathematical evidence. (Focus)

SCI.08.08.01 Students will analyze and interpret data for patterns in the fossil record that documents the existence, diversity, extinction, and change of lifeforms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. (MS-LS 4-1) (Focus)

SCI.08.08.02 Students will construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. (MS-LS 4-4) (Focus)

SCI.08.08.03 Students will use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. (MS LS 4-6) (Focus)

SCI.08.08.04 Students will apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. (MS-LS 4-2) (Foundational)

SCI.08.08.06 Students will gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (MS-LS 4-5) (Introductory)

SCI.08.09 Students will follow the engineering process to develop a device to minimize or maximize thermal energy transfer. (Foundational)

SCI.08.09.01 Students will apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (MS-PS 3-3 Energy) (Foundational)

Earth and Space

Course Purpose

Students will explore how the Earth works as a system, how the Earth connects to the universe, and how both have changed and will continue to change over time. In this process, students will engage collaboratively through evidence-based inquiry processes and scientific discourse to become responsible, scientifically literate citizens. This course is included in the Essentials pathway, which meets all graduation requirements and college entrance requirements

Grade Level Standards and Components

ES.09.01 Students will use data, models, and investigations to develop an understanding of how energy and matter transfer within the Earth system. (Focus)

ES.09.01.01 Students will develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.(HS–ESS2–3) (Focus)
ES.09.01.02 Students will analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.(HS–ESS2–2) (Focus)
ES.09.01.03 (HS–ESS2–1) Students will develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal (time) scales to form continental and ocean-floor features. (Foundational)
ES.09.01.04 (HS–ESS2–4) Students will use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate. (Foundational)
ES.09.01.05 (HS–ESS2–6) Students will develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. (Foundational)
ES.09.01.06 (HS–ESS2–7) Students will construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. (Foundational)
ES.09.01.07 (HS–ESS2–5) Students will plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. (Introductory)

ES.09.02 Students will use science reasoning, data, and models to construct an understanding of the Universe's origin and components.

ES.09.02.01 Students will construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.(HS–ESS1–2) (Focus)
ES.09.02.02 Students will apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history. (HS–ESS1–6) (Focus)
ES.09.02.03) Students will develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. (HS–ESS1–1) (Foundational)
ES.09.02.04 Students will communicate scientific ideas about the way stars, over their life cycle, produce elements.(HS–ESS1–3) (Foundational)
ES.09.02.05 Students will construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. (HS–ESS 2-7) (Foundational)
ES.09.02.06 Students will use mathematical or computational representations to predict the motion of orbiting objects in the solar system. (HS–ESS1–4)(Introductory)

ES.09.03 Students will use science reasoning, data, and models to construct an understanding of the Earth's tectonic movements. (Focus)

ES.09.03.01 Students will evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. (HS–ESS1–5) (Focus)
ES.09.03.02 Students will develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal (time) scales to form continental and ocean-floor features. (HS–ESS2–1)(Foundational)

ES.09.04 Students will investigate relationships between humans and the Earth system.(Focus)

ES.09.04.01 Students will construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. (HS–ESS3–1(Focus)

ES.09.04.02 Students will evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. (HS–ESS3–2) (Introductory)
ES.09.04.03 Students will create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. (HS–ESS3–3)(Introductory)
ES.09.04.04 Students will evaluate or refine a technological solution that reduces impacts of human activities on natural systems.* (HS–ESS3–4)(Introductory)
ES.09.04.05 Students will analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. (HS–ESS3–5) (Introductory)
ES.09.04.06 Students will use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. (HS–ESS3–6)(Introductory)

ES.09.05 Students with apply engineering principles to analyze and evaluate Earth system problems and produce potential solutions. (Focus)

ES.09.05.01 Students will analyze a major global challenge to specify qualitative criteria and constraints for solutions that account for societal needs and wants.(ETS1-1) (Focus)
ES.09.05.02 Students will design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (ETS1-2)(Foundational)
ES.09.05.03 Students will evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. (ETS1-3)(Foundational)
ES.09.05.04 Students will use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relative to the problem.(ETS1-4) (Introductory)

Earth and Space Enriched

Course Purpose

Students will engage in in-depth explorations of how the Earth works as a system, how the Earth connects to the universe, and how both have changed and will continue to change over time. In this process, students will engage collaboratively through evidence-based inquiry processes and scientific discourse to become responsible, scientifically literate citizens. This course is included in the Enriched pathway and supports preparation for AP level courses.

Grade Level Standards and Components

ES.09.01 Students will use data, models, and investigations to develop an understanding of how energy and matter transfer within the Earth system. (Focus)

ES.09.01.01 Students will develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.(HS–ESS2–3) (Focus)
ES.09.01.02 Students will analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.(HS–ESS2–2) (Focus)
ES.09.01.03 (HS–ESS2–1) Students will develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal (time) scales to form continental and ocean-floor features. (Foundational)
ES.09.01.04 (HS–ESS2–4) Students will use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate. (Foundational)
ES.09.01.05 (HS–ESS2–6) Students will develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. (Foundational)
ES.09.01.06 (HS–ESS2–7) Students will construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. (Foundational)
ES.09.01.07 (HS–ESS2–5) Students will plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. (Introductory)

ES.09.02 Students will use science reasoning, data, and models to construct an understanding of the Universe's origin and components.

ES.09.02.01 Students will construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.(HS–ESS1–2) (Focus)
ES.09.02.02 Students will apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history. (HS–ESS1–6) (Focus)
ES.09.02.03) Students will develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. (HS–ESS1–1) (Foundational)
ES.09.02.04 Students will communicate scientific ideas about the way stars, over their life cycle, produce elements.(HS–ESS1–3) (Foundational)
ES.09.02.05 Students will construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. (HS–ESS 2-7) (Foundational)
ES.09.02.06 Students will use mathematical or computational representations to predict the motion of orbiting objects in the solar system. (HS–ESS1–4)(Introductory)

ES.09.03 Students will use science reasoning, data, and models to construct an understanding of the Earth's tectonic movements. (Focus)

ES.09.03.01 Students will evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. (HS–ESS1–5) (Focus)
ES.09.03.02 Students will develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal (time) scales to form continental and ocean-floor features. (HS–ESS2–1)(Foundational)

ES.09.04 Students will investigate relationships between humans and the Earth system.(Focus)

ES.09.04.01 Students will construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. (HS–ESS3–1(Focus)

ES.09.04.02 Students will evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. (HS–ESS3–2) (Introductory)
ES.09.04.03 Students will create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. (HS–ESS3–3)(Introductory)
ES.09.04.04 Students will evaluate or refine a technological solution that reduces impacts of human activities on natural systems.* (HS–ESS3–4)(Introductory)
ES.09.04.05 Students will analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. (HS–ESS3–5) (Introductory)
ES.09.04.06 Students will use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. (HS–ESS3–6)(Introductory)

ES.09.05 Students with apply engineering principles to analyze and evaluate Earth system problems and produce potential solutions. (Focus)

ES.09.05.01 Students will analyze a major global challenge to specify qualitative criteria and constraints for solutions that account for societal needs and wants.(ETS1-1) (Focus)
ES.09.05.02 Students will design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (ETS1-2)(Foundational)
ES.09.05.03 Students will evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. (ETS1-3)(Foundational)
ES.09.05.04 Students will use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relative to the problem.(ETS1-4) (Introductory)

Biology

Course Purpose

Students will engage in science practices to understand and apply principles related to homeostasis, ecosystems, heredity, and evolution.

Grade Level Standards and Components

Sci.Bio.01 Students will develop models and conduct investigations to explain how different cell processes and system interactions enable an organism to maintain homeostasis.

Sci.Bio.01.01 Students will construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. HS-LS1-1. (Focus)

Sci.Bio.01.02 Students will develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS1-2 (Focus)

Sci.Bio.01.03 Students will plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. HS-LS1-3 (Foundational)

Sci.Bio.01.04 Students will use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. HS-LS1-4. (Focus)

Sci.Bio.01.05 Students will use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. HS-LS1-5 (Focus)

Sci.Bio.01.06 Students will construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon based molecules. HS-LS1-6 (Introductory)

Sci.Bio.01.07 Students will use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. HS-LS1-7 (Focus)

Sci.Bio.02 Students will use mathematical models and evaluate evidence to explain how the cycling of matter and the flow of energy affect the biodiversity and overall functioning of ecosystems.

Sci.Bio.02.01. Students will use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.HS-LS2-1 (Focus)

Sci.Bio.02.02 Students will use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. HS-LS2-2. (Foundational)

Sci.Bio.02.03. Students will construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. HS-LS2-3 (Foundational)

Sci.Bio.02.04. Students will use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. HS-LS2-4 (Focus)

Sci.Bio.02.05 Students will develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. HS-LS2-5 (Foundational)

Sci.Bio.02.06 Students will evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. HS-LS2-6 (Foundational)

Sci.Bio.02.07 Students will design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. HS-LS2-7 (Focus)

Sci.Bio.02.08. Students will evaluate the evidence for the role of group behavior on individual and species chances to survive and reproduce. HS-LS2-8 (Introductory)

Sci.Bio.03 Students will ask questions, make and defend claims, and apply mathematical concepts to explain how the information stored in DNA leads to genetic variation within a population.

Sci.Bio.03.01 Students will ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
HS-LS3-1 (Foundational)

Sci.Bio.03.02 Students will make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3)

mutations caused by environmental factors.
HS-LS3-2 (Focus)

Sci.Bio.04 Students will apply mathematical concepts and evaluate evidence to explain the concept of biological evolution by natural selection.

Sci.Bio.04.01 Students will communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. HS-LS4-1. (Focus)

Sci.Bio.04.02 Students will construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
HS-LS4-2. (Focus)

Sci.Bio.03.03 Students will apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS3-3. (Focus)

Sci.Bio.04.04 Students will construct an explanation based on evidence for how natural selection leads to adaptation of populations.LS4-4. (Foundational)

Sci.Bio.04.05 Students will evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.HS-LS4-5 (Foundational)

Sci.Bio.04.06 Students will create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*HS-LS4-6. (Foundational)

Biology Enriched

Course Purpose

Students will engage in science practices to understand and apply principles related to homeostasis, ecosystems, heredity, and evolution.

Grade Level Standards and Components

Sci.EBio.01Students will develop models and conduct investigations to explain how different cell processes and system interactions enable an organism to maintain homeostasis.

Sci.EBio.01.01 Students will construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. HS-LS1-1. (Focus)

Sci.EBio.01.02 Students will develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.HS-LS1-2. (Focus)

Sci.EBio.01.03 Students will use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. HS-LS1-4. (Focus)

Sci.EBio.01.04 Students will use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. HS-LS1-5. (Focus)

Sci.EBio.01.05 Students will use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. HS-LS1-7. (Focus)

Sci.EBio.01.06 Students will plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. HS-LS1-3. (Fundamental)

Sci.EBio.01.07 Students will construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon based molecules. (Introductory)

Sci.EBio.02 Students will use mathematical models and evaluate evidence to explain how the cycling of matter and the flow of energy affect the biodiversity and overall functioning of ecosystems.

Sci.EBio.02.01. Students will use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. HS-LS2-1 (Focus)

Sci.EBio.02.02 Students will use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. HS-LS2-4 (Focus)

Sci.EBio.02.03 Students will design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. HS-LS2-7. (Focus)

Sci.EBio.02.04 Students will use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. HS-LS2-2 (Foundational)

Sci.EBio.02.05 Students will construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. HS-LS2-3. (Foundational)

Sci.EBio.02.06 Students will develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. HS-LS2-5. (Foundational)

Sci.EBio.02.07 Students will evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
HS-LS2-6. (Foundational)

Sci.EBio.02.08 Students will evaluate the evidence for the role of group behavior on individual and species chances to survive and reproduce. HS-LS2-8. (Foundational)

Sci.EBio.03 Students will ask questions, make and defend claims, and apply mathematical concepts to explain how the information stored in DNA leads to genetic variation within a population.

Sci.EBio.03.01 Students will make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
HS-LS3-2. (Focus)

Sci.EBio.03.02 Students will ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. HS-LS3-1 (Foundational)

Sci.EBio.04 Students will apply mathematical concepts and evaluate evidence to explain the concept of biological evolution by natural selection.

Sci.EBio.04.01 Students will apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS3-3. (Focus)

Sci.EBio.04.02 Students will communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. HS-LS4-1. (Focus)

Sci.EBio.04.03 Students will construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. HS-LS4-2. (Focus)

Sci.EBio.04.04 Students will apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait HS-LS4-3 (Foundational)

Sci.EBio.04.05 Students will construct an explanation based on evidence for how natural selection leads to adaptation of populations. LS4-4 (Foundational)

Sci.EBio.04.06 Students will evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. HS-LS4-5 (Foundational)

Sci.EBio.04.07 Students will create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*HS-LS4-6. (Foundational)

Chemistry

Course Purpose

Students will develop an understanding of how the structure of a substance influences its physical and chemical properties. Topics will be investigated using an inquiry approach to problem solving, through lab experiences, engineering design processes, and mathematical modeling. Students will engage in scientific discourse to share, confirm, and challenge ideas.

Grade Level Standards and Components

SCI.C.01 Students will infer the structure and predict the interactions of a substance based on the substance's properties.

SCI.C.01.01 Students will use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. HS-PS1-1 (Focus)
SCI.C.01.02 Students will construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (HS-PS1-2) (Focus)
SCI.C.01.03 Students will plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.(HS-PS1-3). (Foundational)
SCI.C.01.04 Students will develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.(HS-PS1-4) (Foundational)
SCI.CP.01.05 Students will apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.(HS-PS1-5) (Foundational)
SCI.C.01.07 Students Will refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.*(HS-PS1-6) (Introductory)
SCI.C.01.08 Students will develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. (HS-PS1-8) (Introductory)

SCI.P.02 Students will use Newton's Laws to explain the interactions between two or more objects or particles.

SCI.P.02.01 Students will analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. (HS-PS2-1) (Focus)
SCI.P.02.02 Students will use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. (HS-PS2-2) (Focus)
SCI.P.02.03 Students will apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.*(HS-PS2-3) (Foundational)
SCI.P.02.04 Students will use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. (HS-PS2-4) (Foundational)
SCI.P.02.05 Student will plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. (HS-PS2-5) (Introductory)
SCI.CP.02.06 Students will communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.* (HS-PS2-6) (Foundational)

SCI.P.03 Students will explain how energy can be used to determine properties of substance and be transferred between particles.

SCI.P.03.01 Students will create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known (HS-PS3-1) (Focus)
SCI.P.03.02 Students will develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). (Focus)
SCI.P.03.03 Students will design, build, and refine a device that works within given constraints to convert one

form of energy into another form of energy.* (HS-PS3-3) (Foundational)
SCI.P.03.04 Students will develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. (HS-PS3-5) (Foundational)
SCI.P.03.05 Students will plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). (In Chem unit) (HS-PS3-4). (Introductory)

SCI.P.04 Students will explain how different media affect the motion of a wave as it passes through them.

SCI.P.04.01 Students will use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. (HS-PS4-1) (Focus)
SCI.P.04.02 Students will evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. (HS-PS4-4). (Foundational)
SCI.P.04.03 Students will evaluate questions about the advantages of using a digital transmission and storage of information.(HS-PS4-2) (Introductory)
SCI.P.04.04 Students will evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. HS-PS4-3. (Introductory)
SCI.P.04.05 Students will communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.*HS-PS4-5. (Focus)

SCI.P.05 Students will analyze a problem and design, test and evaluate a solution to that problem.

SCI.P.05.01 Students will analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (HS-ETS1-1) (Focus)
SCI.P.05.02 Students will design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS-ETS1-2) (Foundational)
SCI.P.05.03 Students will evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. (HS-ETS1-3) (Introductory)
SCI.P.05.04 Students will use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. (HS-ETS1-4) (Introductory)

Chemistry Enriched

Course Purpose

Students will develop an understanding of how the structure of a substance influences its physical and chemical properties. Topics will be investigated using an inquiry approach to problem solving, through lab experiences, engineering design processes, and mathematical modeling. Students will engage in scientific discourse to share, confirm, and challenge ideas

Grade Level Standards and Components

SCI.CHEM.01 Students will infer the structure and predict the properties of an atom.

SCI.CHEM.01.01 Students will use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. (HS-PS1-1) (Focus)
SCI.CHEM.01.02 Students will use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.(HS-PS2-4) (Foundational)
SCI.CHEM.01.03 Students will evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. (HS-PS4-4) (Introductory)
SCI.CHEM.01.04 Students will develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay (HS-PS1-8) (Introductory)

SCI.CHEM.02 Students will infer the structure and predict the interactions of a substance based on the substances properties.

SCI.CHEM.02.01 Students will construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (HS-PS1-2) (Focus)
SCI.CHEM.02.02 Students will plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (HS-PS1-3) (Focus)
SCI.CHEM.02.03 Students will refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.*(HS-PS1-6) (Foundational)

SCI.CHEM.03 Students will use mathematical proportions to support mass conservation.

SCI.CHEM.03.01 Students will use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. (HS-PS1-7)

SCI.CHEM.04 Students will predict the properties of a substance based on the energy (due to motion or position of particles) of the system.

SCI.CHEM.04.01 Students will develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. (HS-PS1-4) (Focus)
SCI.CHEM.04.02 Students will develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). (HS-PS3-2) (Focus)
SCI.CHEM.04.03 Students will apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. (HS-PS1-5) (Focus)
SCI.CHEM.04.04 Students will create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known (HS-PS3-1) (Foundational)
SCI.CHEM.04.05 Students will design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.* (HS-PS3-3) (Introductory)
SCI.CHEM.04.06 Students will develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. (HS-PS3-5) (Introductory)
SCI.CHEM.04.07 Students will plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more

uniform energy distribution among the components in the system (second law of thermodynamics).(HS-PS3-4) (Introductory)

SCI.CHEM.05 Students will analyze a problem and design, test and evaluate a solution to that problem.

SCI.CHEM.05.01 Students will design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS-ETS1-2) (Focus)
SCI.CHEM.05.02 Students will evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. (HS-ETS1-3) (Foundational)
SCI.CHEM.05.03 Students will analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (HS-ETS1-1) (Introductory)
SCI.CHEM.05.04 Students will use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.(HS-ETS1-4) (Introductory)

Physics

Course Purpose

Students will develop an understanding of the physical world around them. Topics will be investigated using an inquiry approach to problem solving, through lab experiences, engineering design processes, and mathematical modeling. Students will engage in scientific discourse to share, confirm, and challenge ideas.

Grade Level Standards and Components

SCI.PHYS.01 Forces Students will model the relationship between forces and motion.

SCI.PHYS.01.01 Students will analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. (HS-PS2-1) (Focus)

SCI.PHYS.01.02 Students will use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. (HS-PS2-4) (Foundational)

SCI.PHYS.01.03 Students will develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. (HS-PS3-5) (Foundational)

SCI.PHYS.02 - Momentum Students will create system models to represent relationships within collisions.

SCI.PHYS.02.01 Students will use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. (HS-PS2-2) (Focus)

SCI.PHYS.02.02 Students will apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.* (HS-PS2-3) (Foundational)

SCI.PHYS.04 - Energy Students will create system models to represent energy transfer.

SCI.PHYS.04.01 Students will develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). (HS-PS3-2) (Focus)

SCI.PHYS.04.02 Students will create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. (HS-PS3-1) (Focus)

SCI.PHYS.04.03 Students will design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.* (HS-PS3-3) (Foundational)

SCI.PHYS.05 Waves Students will model properties of waves.

SCI.PHYS.05.01 Students will use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. (HS-PS4-1) (Focus)

SCI.PHYS.05.02 Students will evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. (HS-PS4-4) (Foundational)

SCI.PHYS.05.03 Students will communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.(HS-PS4-5) (Foundational)

SCI.PHYS.05.04 Students will evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. (HS-PS4-3) (Foundational)

SCI.PHYS.07.01 Students will evaluate questions about the advantages of using a digital transmission and storage of information(HS-PS4-2) (Introductory)

Physics Enriched

Course Purpose

Students will conceptually describe motion of objects or particles using forces, work and energy, and momentum, electricity and waves. Students will investigate topics using an inquiry approach to problem solving, through lab experiences, engineering design processes, and mathematical modeling.

Grade Level Standards and Components

SCI.EPHYS.01 Science Practices Students will design scientific investigations and analyze collected data to answer a scientific question.

SCI.EPHYS.01.01 Students will design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS-ETS1-2) (Focus)
SCI.EPHYS.01.02 Students will plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.(HS-PS2-5) (Foundational)

SCI.EPHYS.02 Forces Students will model the relationship between forces and motion.

SCI.EPHYS.02.01 Students will analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. (HS-PS2-1) (Focus)
SCI.EPHYS.02.02 Students will use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. (HS-PS2-4) (Focus)
SCI.EPHYS.02.03 Students will develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.(HS-PS3-5) (Foundational)

SCI.EPHYS.03 -Momentum Students will create system models to represent relationships within collisions.

SCI.EPHYS.03.01 Students will use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. (HS-PS2-2) (Focus)
SCI.EPHYS.03.02 Students will apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.* (HS-PS2-3)
(Focus)
SCI.EPHYS.04.01 Students will develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). (HS-PS3-2) (Focus)
SCI.EPHYS.04.02 Students will create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. (HS-PS3-1) (Focus)
SCI.EPHYS.04.03 Students will design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.* (HS-PS3-3) (Focus)

SCI.EPHYS.05 Waves Students will model properties of waves.

SCI.EPHYS.05.01 Students will use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. (HS-PS4-1) (Focus)
SCI.EPHYS.05.02 Students will evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. (HS-PS4-4) (Fountational)
SCI.EPHYS.05.03 Students will communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.(HS-PS4-5) (Foundational)
SCI.EPHYS.05.04 Students will evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. (HS-PS4-3) (Foundational)
SCI.EPHYS.07.01

Students will evaluate questions about the advantages of using a digital transmission and storage of information. (HS-PS4-2) (Introductory)

Anatomy and Physiology

Course Purpose

Students will conduct an in-depth study of the structures and functions of the mammalian body. This course explores interrelationships of body systems with an emphasis on skeletal, muscular, circulatory, respiratory, digestive, integumentary, nervous, and endocrine systems. Students will further their science literacy skills through dissection, laboratory experiences, and clinical studies. The material learned in this course can be applied to medical field careers, health and fitness careers, and biological research careers.

Grade Level Standards and Components

SCI.ANAT.01 Students will understand and apply the anatomical terminology and concepts related to the organization of the human body

SCI.ANAT.01.01 Students will analyze how structures relate to function in body systems. (Focus)
SCI.ANAT.01.02 Students will explain the interrelationships between human body systems. (Focus)
SCI.ANAT.01.03 Students will analyze the causes and effects of homeostatic imbalances in the body systems. (Focus)

SCI.ANAT.02 Students will understand and apply the anatomical terminology and concepts related to the Skeletal System

SCI.ANAT.02.01 Students will analyze how structures relate to function in body systems. (Focus)
SCI.ANAT.02.02 Students will explain the interrelationships between human body systems. (Focus)
SCI.ANAT.02.03 Students will analyze the causes and effects of homeostatic imbalances in the body systems. (Focus)
SCI.ANAT.02.04 students will dissect and differentiate the structures of body systems. (Focus)

SCI.ANA.03 Students will understand and apply the anatomical terminology and concepts related to the Muscular System

SCI.ANAT.03.01 Students will analyze how structures relate to function in body systems. (Focus)
SCI.ANAT.03.02 Students will explain the interrelationships between human body systems. (Focus)
SCI.ANAT.03.03 Students will analyze the causes and effects of homeostatic imbalances in the body systems. (Focus)
SCI.ANAT.03.04 Students will dissect and differentiate the structures of body systems. (Focus)

SCI.ANAT.04 Students will understand and apply the anatomical terminology and concepts related to the Integumentary System

SCI.ANAT.04.01 Students will analyze how structures relate to function in body systems. (Focus)
SCI.ANAT.04.02 Students will explain the interrelationships between human body systems. (Focus)
SCI.ANAT.04.03 Students will analyze the causes and effects of homeostatic imbalances in the body systems. (Focus)
SCI.ANAT.04.04 Students will dissect and differentiate the structures of body systems (Focus)

SCI.ANAT.05 Students will understand and apply the anatomical terminology and concepts related to the Respiratory System

SCI.ANAT.05.01 Students will analyze how structures relate to function in body systems. (Focus)
SCI.ANAT.05.02 Students will explain the interrelationships between human body systems. (Focus)
SCI.ANAT.05.03 Students will analyze the causes and effects of homeostatic imbalances in the body systems. (Focus)
SCI.ANAT.05.04 Students will dissect and differentiate the structures of body systems. (Focus)

SCI.ANAT.06 Students will understand and apply the anatomical terminology and concepts related to the Digestive System

SCI.ANAT.06.01 Students will analyze how structures relate to function in body systems. (Focus)

SCI.ANAT.06.02 Students will explain the interrelationships between human body systems. (Focus)
SCI.ANAT.06.03 Students will analyze the causes and effects of homeostatic imbalances in the body systems. (Focus)
SCI.ANAT.06.04 Students will dissect and differentiate the structures of body systems. (Focus)
SCI.ANAT.07.01 Students will analyze how structures relate to function in body systems. (Focus)
SCI.ANAT.07.02 Students will explain the interrelationships between human body systems. (Focus)
SCI.ANAT.07.03 Students will analyze the causes and effects of homeostatic imbalances in the body systems. (Focus)
SCI.ANAT.07.04 Students will dissect and differentiate the structures of body systems. (Focus)

SCI.ANAT.07 Students will understand and apply the anatomical terminology and concepts related to the Urogenital System

SCI.ANAT.07.01 Students will analyze how structures relate to function in body systems. (Focus)
SCI.ANAT.07.02 Students will explain the interrelationships between human body systems. (Focus)
SCI.ANAT.07.03 Students will analyze the causes and effects of homeostatic imbalances in the body systems. (Focus)
SCI.ANAT.07.04 Students will dissect and differentiate the structures of body systems. (Focus)

Geology

Course Purpose

Students will learn about the history of the earth, the physical features of the earth and the processes acting on them, and the ways in which the earth has changed and will continue to change in the future.

Grade Level Standards and Components

HS.GEO.01 Students will explain how natural forces continually change the surface of the Earth.

HS.GEO.01.01 Students will explain how the movement of earth plates create and destroy the features on earth's surface. (Focus)

HS.GEO.01.02 Students will explain how weathering and erosion change the earth on and below the surface. (Focus)

SCI.GEO.02 Students will explain the geologic processes and historical events

HS.GEO.02.01 Students will identify minerals by using a model to interpret physical and chemical characteristics. (Focus)

HS.GEO.02.02 Students will explain the processes of the rock cycle which allow rock to be classified into the three different main rock types. (Focus)

HS.GEO.02.03 Students will explain the historical events which produced different stratigraphic profiles. (Focus)

HS.GEO.02.04 Students will identify different types of igneous, sedimentary, and metamorphic rock by name. (Focus)

Astronomy

Course Purpose

Students will explain the history and theory of astronomy, the solar system, and the relationship between the sun, moon and earth.

Grade Level Standards and Components

SCI.AST.01 Students will explain the historical development of modern astronomy and hypotheses/theories of the origins and structures of stars, galaxies, and the universe.

SCI.AST.01.01 Students will construct a timeline that explains the historical development of astronomy. (Focus)
SCI.AST.01.02 Students will construct an explanation of the history of galaxy formation and the universe. (Focus)
SCI.AST.01.03 Students will explain the evolution of stars and their characteristics. (Focus)
SCI.AST.01.04 Students will develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy in the form of radiation. (Foundational)
SCI.AST.01.05 Students will use mathematical or computational representations to predict the motion and relationships of objects in space. (Introductory)

SCI.AST.02 students will explain the origin and properties of our Solar System.

SCI.AST.02.01 students will explain the solar nebula theory and the resulting characteristics of the planets and other celestial objects within our solar system. (Focus)
HS-AST.02.02 students will apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history. (Foundational)
SCI.AST.02.03 students will describe the different features of the Earth's moon. (Foundational)

SCI.AST.03 Students will explain the relationship between the earth, moon, and sun.

SCI.AST.03.01 Students will explain how relative positions and motions can impact the seasons, length of day and year, tides, lunar and solar eclipses, and lunar phases. (Foundational)
SCI.AST.03.02 students will describe the reason that the appearance of the night sky and positions of the stars changes at different times. (Foundational)

AP Chemistry

Course Purpose

AP Chemistry students will understand and apply chemistry topics that include: atomic structure and properties, molecular and ionic compound structure and properties, intermolecular forces, chemical reactions, kinetics, thermodynamics, equilibrium, acids and bases, and applications of thermodynamics.

Grade Level Standards and Components

SCI.APCHEM.01 Students will understand and apply concepts related to atomic structure and properties.

SCI.APCHEM.01.01 Students will analyze and evaluate how scale proportion and quantity are affected by atomic structure and properties. (SPQ) (Focus)

SCI.APCHEM.01.02 Students will analyze and evaluate how properties are affected by atomic structure. (SAP) (Focus)

SCI.APCHEM.02 Students will understand and apply concepts related to the structure and properties of molecular and ionic compounds.

SCI.APCHEM.02.01 Students will analyze and evaluate how molecular and ionic compounds are affected by their structure and properties. (SAP) (Focus)

SCI.APCHEM.03 Students will understand and apply concepts related to intermolecular forces and properties

SCI.APCHEM.03.01 Students will analyze and evaluate how scale proportion and quantity affect intermolecular forces and their properties. (SPQ) (Focus)

SCI.APCHEM.03.02 Students will analyze and evaluate how intermolecular forces are affected by structure and properties.(SAP) (Focus)

SCI.APCHEM.04 Students will understand and apply concepts related to chemical reactions

SCI.APCHEM.04.01 Students will analyze and evaluate how scale proportion and quantity affect chemical reactions. (SPQ) (Focus)

SCI.APCHEM.04.02 Students will analyze and evaluate how transformations affect chemical reactions. (TRA) (Focus)

SCI.APCHEM.05 Students will understand and apply concepts related to kinetics.

SCI.APCHEM.05.01 Students will analyze and evaluate how transformations affect kinetics. (TRA) (Focus)

SCI.APCHEM.05.02 Students will analyze and evaluate how energy affects kinetics. (ENE) (Focus)

SCI.APCHEM.06 Students will understand and apply concepts related to thermodynamics.

SCI.APCHEM.06.01 Students will analyze and evaluate how energy is affected by thermodynamics. (ENE) (Focus)

SCI.APCHEM.07 Students will understand and apply concepts related to equilibrium.

SCI.APCHEM.07.01 Students will analyze and evaluate how transformations affects equilibrium. (TRA) (Focus)

SCI.APCHEM.08 Students will understand and apply concepts related to acids and bases.

SCI.APCHEM.08.01 Students will analyze and evaluate how structure and properties affect acids and bases. (SAP) (Focus)

SCI.APCHEM.09 Students will understand and apply concepts related to the application of thermodynamics.

SCI.APCHEM.09.01 Students will analyze and evaluate how scale proportion and quantity effect applications of thermodynamics. (SPQ) (Focus)

SCI.APCHEM.09.02 Students will analyze and evaluate how structure and properties affect applications of thermodynamics. (SAP) (Focus)

SCI.APCHEM.09.03 Students will Analyze and evaluate how energy affects applications of thermodynamics. (ENE) (Focus)

AP Physics

Course Purpose

AP Physics students will investigate topics in kinematics, dynamics, energy, momentum, rotation, gravitation and oscillation.

Grade Level Standards and Components

SCI.APMECH.01Kinematics-Students will understand and apply physics concepts related to kinematics.

SCI.APMECH.01.01Students will analyze and evaluate how there are the relationships among the vector quantities of position, velocity, and acceleration for the motion of a particle along a straight line. (Focus)

SCI.APMECH.01.02 Students will analyze and evaluate how there are multiple simultaneous relationships among the quantities of position, velocity, and acceleration for the motion of the particle moving in more than one dimension with or without net forces. (Focus)

SCI.APMECH.02 Newton's Law of Motion-Students will understand and apply physics concepts related to Newton's laws of motion.

SCI.APMECH.02.01Students will analyze and evaluate how a net force will change the translational motion of an object. (FORCE INTERACTIONS) (Focus)

SCI.APMECH.02.02 Students will analyze and evaluate how the motion of some objects is constrained so that forces acting on the object cause it to move in a circular path. (FORCE INTERACTIONS) (Focus)

SCI.APMECH.02.03 Students will analyze and evaluate how there are force pairs with equal magnitude and opposite directions between any two interacting objects. (FORCE INTERACTIONS) (Focus)

SCI.APMECH.03 Work, Energy, and Power-Students will understand and apply physics concepts related to work, energy, and power.

SCI.APMECH.03.01Students will analyze and evaluate how when a force is exerted on an object, and the energy of the object changes, then work was done on the object. (FORCE INTERACTIONS) (Focus)

SCI.APMECH.03.02 Students will analyze and evaluate how conservative forces internal to the system can change the potential energy of that system. (CONSERVATION) (Focus)

SCI.APMECH.03.03 Students will analyze and evaluate how the energy of a system can transform from one form to another without changing the total amount of energy in the system. (CONSERVATION) (Focus)

SCI.APMECH.03.04 Students will analyze and evaluate how the energy of an object or a system can be changed at different rates. (CONSERVATION) (Focus)

SCI.APMECH.04 Systems of Particles and Linear Momentum-Students will understand and apply physics concepts related to systems of particles and linear momentum.

SCI.APMECH.04.01 Students will analyze and evaluate how the linear motion of a system can be described by the displacement, velocity, and acceleration of its center of mass. (CHANGE) (Focus)

SCI.APMECH.04.02 Students will analyze and evaluate how an impulse exerted on a n object will change the linear momentum of the object. (FORCE INTERACTIONS) (Focus)

SCI.APMECH.04.03 Students will analyze and evaluate how in the absence of an external force, the total momentum within a system can transfer from one object to another without changing the total momentum in the system. (CONSERVATION) (Focus)

SCI.APMECH.05 Rotation-Students will understand and apply physics concepts related to rotation.

SCI.APMECH.05.01Students will analyze and evaluate how when a physical system involves an extended rigid body, there are two conditions of equilibrium - a translational condition and a rotational condition. (FORCE INTERACTIONS) (Focus)

SCI.APMECH.05.02 Students will analyze and evaluate how there are relationships among the physical properties of angular velocity, angular position, and angular acceleration. (CHANGE) (Focus)

SCI.APMECH.05.03 Students will analyze and evaluate how a net torque acting on a rigid extended body will produce a rotational motion about a fixed axis. (FORCE INTERACTIONS) (Focus)

SCI.APMECH.05.04 Students will analyze and evaluate how in the absence of an external torque, the total angular momentum of a system can transfer from one object to another within the system without changing the total angular momentum of the system. (CONSERVATION) (Focus)

SCI.APMECH.06 Oscillation-Students will understand and apply physics concepts related to oscillation.

SCI.APMECH.06.01Students will analyze and evaluate how there are certain types of forces that cause objects to repeat their motions with a regular pattern. (FORCE INTERACTIONS) (Focus)

SCI.APMECH.07 Gravitation-Students will understand and apply physics concepts related to gravitation.

SCI.APMECH.07.01Students will analyze and evaluate how objects of large mass will cause gravitational fields that create an interaction at a distance with other object with mass. (FIELDS) (Focus)

SCI.APMECH.07.02 Students will analyze and evaluate how angular momentum and total mechanical energy will not change for a satellite in an orbit. (CONSERVATION) (Focus)

SCI.APEM.01Electrostatics-Students will understand and apply physics concepts related to electrostatics.

SCI.APEM.03.01Students will analyze and evaluate how the rate of change flow through a conductor depends on the physical characteristics of the conductor. (FIELDS) (Focus)

SCI.APEM.03.02 Students will analyze and evaluate how there are electrical devices that convert electrical potential energy into other forms of energy. (CONSERVATION) (Focus)

SCI.APEM.03.03 Students will analyze and evaluate how total energy and change are conserved in a circuit containing resistors and a source of energy. (CONSERVATION) (Focus)

SCI.APEM.03.04 Students will analyze and evaluate how total energy and charge are conserved in a circuit that includes resistors, capacitors and a source of energy. (CONSERVATION) (Focus)

SCI.APEM.04 Magnetic Fields-Students will understand and apply physics concepts related to magnetic fields.

SCI.APEM.04.01Students will analyze and evaluate how charged particles moving through a magnetic field may change the direction of their motion. (CHANGE) (Focus)

SCI.APEM.04.02 Students will analyze and evaluate how a magnetic field can interact with a straight conducting wire with current. (FIELDS) (Focus)

SCI.APEM.04.03 Students will analyze and evaluate how current-carrying conductors create magnetic fields that allow them to interact at a distance with other magnetic fields. (FIELDS) (Focus)

SCI.APEM.04.04 Students will analyze and evaluate how there are laws that use symmetry and calculus to derive mathematical relationships that are applied to physical systems containing moving charge. (CONSERVATION) (Focus)

SCI.APEM.05 Electromagnetism-Students will understand and apply physics concepts related to electromagnetism.

SCI.APEM.05.01 Students will analyze and evaluate how there are laws that use symmetry and calculus to derive mathematical relationships that are applied to physical systems containing a magnetic field (CONSERVATION); a changing magnetic field over time can induce current in conductors (FIELDS); and induced forces (arising from magnetic interactions) that are exerted on objects can change the kinetic energy of an object. (FORCE INTERACTIONS). (Focus)

SCI.APEM.05.02 Students will analyze and evaluate how in a closed circuit containing inductors and resistors, energy and change are conserved. (CONSERVATION) (Focus)

SCI.APEM.05.03 Students will analyze and evaluate how electric and magnetic fields that change over time can mutually induce other electric and magnetic fields. (FIELDS) (Focus)

AP Biology

Course Purpose

Students will understand and apply concepts to include Biochemistry, Cells, Energetics, Heredity, Molecular Biology, Evolution, Diversity, Plant Structure and Function, and Animal Structure and Function.

Grade Level Standards and Components

SCI.APBIO.01 Students will understand and apply concepts related to the chemistry of life.

SCI.APBIO.01.01 Students will analyze and evaluate how biological systems use energy and molecular building blocks to grow, reproduce, and maintain homeostasis (ENE) (Focus)

SCI.APBIO.01.02 Students will analyze and evaluate how living systems store, retrieve, transmit, and respond to information essential to life processes(IST) (Focus)

SCI.APBIO.01.03 Students will analyze and evaluate how biological systems interact and how the systems and interactions exhibit complex properties (SYI)

SCI.APBIO.02 Students will understand and apply concepts related to cell structure and function.

SCI.APBIO.02.01 Students will analyze and evaluate how the process of evolution drives the diversity and unity of life. (EVO) (Focus)

SCI.APBIO.02.02 Students will analyze and evaluate how biological systems use energy and molecular building blocks to grow, reproduce, and maintain homeostasis. (ENE) (Focus)

SCI.APBIO.02.03 Students will analyze and evaluate how biological systems interact and how the systems and interactions exhibit complex properties. (SYI) (Focus)

SCI.APBIO.03 Students will understand and apply concepts related to cellular energetics.

SCI.APBIO.03.01 Students will analyze and evaluate how biological systems use energy and molecular building blocks to grow, reproduce, and maintain homeostasis. (ENE) (Focus)

SCI.APBIO.03.02 Students will analyze and evaluate how biological systems interact and how the systems and interactions exhibit complex properties. (SYI) (Focus)

SCI.APBIO.04 Students will understand and apply concepts related to cell communication and cell cycle.

SCI.APBIO.04.01 Students will analyze and evaluate how biological systems use energy and molecular building blocks to grow, reproduce, and maintain homeostasis. (ENE) (Focus)

SCI.APBIO.04.02 Students will analyze and evaluate how living systems store, retrieve, transmit, and respond to information essential to life processes (IST) (Focus)

SCI.APBIO.05 students will understand and apply concepts related to heredity.

SCI.APBIO.05.01 Students will analyze and evaluate how the process of evolution drives the diversity and unity of life related to heredity. (EVO) (Focus)

SCI.APBIO.05.02 Students will analyze and evaluate how living systems store, retrieve, transmit, and respond to information essential to life processes related to heredity (IST) (Focus)

SCI.APBIO.05.03 Students will analyze and evaluate how biological systems interact and how the systems and interactions exhibit complex properties. (SYI) (Focus)

SCI.APBIO.06 Students will understand and apply concepts related to gene expression and regulation.

SCI.APBIO.06.01 Students will analyze and evaluate how living systems store, retrieve, transmit, and respond to information essential to life processes related to gene expression and regulation. (IST) (Focus)

SCI.APBIO.07 Students will understand and apply concepts related to natural selection.

SCI.APBIO.07.01 Students will analyze and evaluate how the process of evolution drives the diversity and unity of life related natural selection. (EVO) (Focus)

SCI.APBIO.07.02 Students will analyze and evaluate how biological systems interact and how the systems and interactions exhibit complex properties related natural selection. (SYI) (Focus)

SCI.APBIO.08 Students will understand and apply concepts related to ecology.

SCI.APBIO.08.01 Students will analyze and evaluate how the process of evolution drives the diversity and unity of life related to ecology. (EVO) (Focus)

SCI.APBIO.08.02 Students will analyze and evaluate how biological systems use energy and molecular building blocks to grow, reproduce, and maintain homeostasis related to ecology. (ENE) (Focus)
SCI.APBIO.08.03 Students will analyze and evaluate how living systems store, retrieve, transmit, and respond to information essential to life processes related to ecology. (IST) (Focus)
SCI.APBIO.08.04 Students will analyze and evaluate how biological systems interact and how the systems and interactions exhibit complex properties related to ecology. (SYI) (Focus)

AP Environmental Science

Course Purpose

Students will engage in science practices to understand and apply principles related to sustainability, ecology, energy, and pollution; to understand processes and interrelationships within the natural world; and to identify and analyze environmental problems.

Grade Level Standards and Components

SCI.APES.01 Students will understand and apply concepts related to ecosystems. (Focus)

SCI.APES.01.01 Students will analyze the factors that influence the characteristics of ecosystems and how matter cycles and energy flows through ecosystems. (Focus)

SCI.APES.02Students will understand and apply concepts related to biodiversity. (Focus)

SCI.APES.02.01 Students will analyze the factors that influence the biodiversity of an ecosystem and how natural and human disruptions of an ecosystem affect biodiversity. (Focus)

SCI.APES.03 Students will understand and apply concepts related to populations. (Focus)

SCI.APES.03.01 Students will analyze the factors that influence size and rates of change of human and non-human populations. (Focus)

SCI.APES.04 Students will understand and apply concepts related to Earth systems and resources. (Focus)

SCI.APES.04.01 Students will analyze the composition and properties of Earth systems and evaluate how humans interact with, influence, and utilize them. (Focus)

SCI.APES.05 Students will understand and apply concepts related to land and water use. (Focus)

SCI.APES.05.01 Students will students will evaluate the human utilization of various land and water resources, as well as the effects and sustainability of these utilizations. (Focus)

SCI.APES.06 Students will understand and apply concepts related to energy resources and consumption. (Focus)

SCI.APES.06.01 Students will evaluate the acquisition, utilization, and conservation of renewable and nonrenewable energy resources. (Focus)

SCI.APES.07 Students will understand and apply concepts related to atmospheric pollution. (Focus)

SCI.APES.07.01 Students will analyze various forms of atmospheric pollution and their impacts on the environment, human health, and economies, and evaluate potential solutions. (Focus)

SCI.APES.08 Students will understand and apply concepts related to aquatic and terrestrial pollution. (Focus)

SCI.APES.08.01 Students will analyze various forms of aquatic and terrestrial pollution and their impacts on the environment, human health, and economies, and evaluate potential solutions. (Focus)

SCI.APES.09 Students will understand and apply concepts related to global change. (Focus)

SCI.APES.09.01 Students will analyze the factors driving ozone depletion, climate change, and biodiversity loss and their effects, and evaluate human efforts to respond to these changes. (Focus)

SCI.APES.10 Students will understand and apply science practices in environmental science contexts. (Focus)

SCI.APES.10.01 Students will create, carry out, and evaluate experiments to answer questions related to the environment. (Focus)

SCI.APES.10.02 Students will analyze, evaluate, and explain experimental data collected in lab and field investigations. (Focus)