School District of Three Lakes

Science Curriculum

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(Committee Members: Dianna Blicharz, Jaime Bock, Emily Brown, Sue Crist, Jim Kuchenbecker, Kara Liebscher, Robin LeMoine, Terri Lorbetske, Rob Peterson, Pete Schoff, Julie Stefonik, Ashley Stroud, Al Votis, Donna Welhoefer, and Bill Greb.)

Philosophy:
Our first task and central purpose of science education is to awaken in the child, whether or not he/she will become a professional scientist, a sense of curiosity and a sense of the intellectual power of science. Science education ought to increase the child's appreciation of him/herself and the world.

We will strive to set up learning experiences that will enable students to develop to their maximum potential. The major emphasis of the science curriculum is the development of process skills, i.e. opportunities to see, think, question, and apply what is learned. The content is the vehicle to develop these skills, and the major emphasis of evaluation should be directed toward active involvement in the process skills. To embrace these ideals the Science curriculum has adopted the *Next Generation Science Standards* as the basis for the District Science Curriculum. The *Next Generation Science Standards* identify content and science and engineering practices that all students should learn from kindergarten to high school graduation. Main reasons for moving in this direction are two fold. First the district is in agreement that students need to understand how the content relates to "their" world in terms of what *Next Generation* refers to engineering practices. The District is firm in its belief that along with rigor students learn more and with greater ease when relevance is instilled throughout the curriculum; the engineering practices interwoven throughout the *Next Generation* content provides significance relevance.

General Goals:

1. To demonstrate an understanding of the processes of science – observing, classifying, predicting, measuring, estimating, communicating, making operational definitions, interpreting data, formulating questions and hypotheses, experimenting, and formulating models.
2. To develop a body of science knowledge through investigative processes.
3. To develop an understanding of the nature of science and its impact on society.
4. To develop an awareness and appreciation for the environment and the interrelationships within the environment.
5. To develop critical thinking skills in order to formulate and substantiate opinions on conflicting issues.
6. To develop an understanding of self, both physical and emotional aspects.
7. Acquire information about people who have contributed to the development of major ideas in sciences and learn about the cultures in which these people lived and worked.

Program Evaluation

State assessment in science is done at the 4th, 8th, and 10th grade levels. Classroom assessment is primarily done to evaluate instruction and communicate progress to students and parents. This is a combination of observations, projects, quizzes, performance tasks, student notes and journals, and tests.

MODEL SCIENCE CLASSROOM GRADES K-12

The teacher will:

1. Make resources available such as books, lab equipment, scientific journals, textbooks, technology, physical models
2. Show enthusiasm for learning
3. Provide a safe learning environment both physically and psychologically
4. Model the Scientific Method
5. Extend lessons to include higher order thinking skills
6. Link learning to authentic tasks
7. Have high expectations for students
8. Model various learning strategies
9. Provide a variety of activities to accommodate individual learning styles
10. Maintain professional development
11. Keep students up to date with current changes
12. Discuss what scientists do with new information and how it effects scientific theory
13. Discuss how scientists use technology in the research process
14. Demonstrate how to read a dichotomous key or flow chart

Kindergarten

Description: The goal of the kindergarten science program is to provide an introduction to a variety of topics in the life, physical, and earth sciences. This level will study: Earth's Systems, Earth and Human Activity, From Molecules to Organisms (Structures and Processes), Motion and Stability (Forces and Interactions), Energy, Engineering and Health.

Resources Available: Books, Videos, DVDs, Community Based Resources, Field Trips, Video Streaming

Students will be able to:

Earth's Systems

K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time.

K-ESS2-2 Construct and argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Earth and Human Activity

K-ESS3-1 Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

K-ESS3-2 Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.*

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land water, water, air, and/or other living things in the local environment.

From Molecules to Organisms (Structures and Processes)

K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.

Motion and Stability (Forces and Interactions)

K-PS2-1 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-PS2-2 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-PS3 Energy

K-PS3-1 Make observations to determine the effect of sunlight on Earth's surface.

K-PS3-2 Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.*

Health

K-TLH-1 Identify body parts

K-TLH-2 Demonstrate and use good health practices (hygiene, food choices, exercise, personal habits)

K-TLH-3 Use safe practices on playground, at home, at school, and on the bus.

K-TLH-4 Learn and practice emergency procedures for fire and tornadoes.

K-2-ETS1 Engineering Design

K-2-ETS1-1 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-ETS1-2 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-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

- Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)
- Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other

people. (K-2-ETS1-2)

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)

First Grade

Description: The goal of the first grade science program is to provide an introduction to a variety of topics in the life, physical, and earth sciences. This level will study: Earth's place in the universe, From Molecules to Organisms (Structures and Processes), Heredity (Inheritance and Variation of Traits), and Waves and their Applications in Technologies for Information Transfer and Health.

Resources Available: Books, video/DVD's, Guidance Department, Community-based resources, Field trips, and Video streaming.

Students will be able to:

Earth's Place in the Universe:

1-ESS1-1	Use observations of the sun, moon, and stars to describe patterns that can be predicted.
1-ESS1-2	Make observations at different times of year to relate the amount of daylight to the time of year.

From Molecules to Organisms (Structures and Processes)

1-LS1-1	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-LS1-2	Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

Heredity: Inheritance and Variation of Traits

1-LS3-1	Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Waves and their Applications in Technologies for Information Transfer

1-PS4-1	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
1-PS4-2	Make observations to construct an evidence-based account that objects can be seen only when illuminated.
1-PS4-3	Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
1-PS4-4	Use tools and materials to design and build a device that used light or sound to solve the problem of communicating over a distance.*

Health

1-TLH-1	Identify foods and classify them according to the food pyramid.
1-TLH-2	Record and classify food that they've eaten in a one-week span,
1-TLH-3	Practice table manners in the lunch room.
1-TLH-4	Practice healthy personal habits (social, physical, mental)
1-TLH-5	Identify and practice safety skills for: playground, school, bus, bike,

personal safety, and emergency procedures (fire, tornado, ...)

K-2-ETS1 Engineering Design

K-2-ETS1-1 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-ETS1-2 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-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

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- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)
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- Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)

Second Grade

Description: The goal of the second grade science program is to provide an introduction to a variety of topics in the life, physical, and earth sciences. This level will study: Earth's Place in the Universe, Earth's Systems, Ecosystems: Interactions, Energy, and Dynamics, Biological Evolution: Unity and Diversity, Matter and its Interactions, Energy, Engineering and Health.

Resources Available: Books, Videos, DVDs, Community Based Resources, Field Trips, Video Streaming

Students will be able to:

Earth's Place in the Universe

2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly

Earth's Systems

2-ESS2-1	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*
2-ESS2-2	Develop a model to represent the shapes and kinds of land and bodies of water in an area.
2-ESS2-3	Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Ecosystems: Interactions, Energy, and Dynamics

2-LS2-1	Plan and conduct an investigation to determine if plants need sunlight and water to grow.
2-LS2-2	Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

Biological Evolution: Unity and Diversity

2-LS4-1	Make observations of plants and animals to compare the diversity of life in different habitats.

Matter and its Interactions

2-PS1-1	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
2-PS1-2	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*
2-PS1-3	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-PS1-4	Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

Energy

2-PS3-a	Carry out investigations to determine the relationship among friction, motion, and the warming of objects.
2-PS3-b	Define a problem caused by either too much or too little friction between two objects and develop solutions that address the problem.*

Health

2-TLH-1	Review types of teeth and describe the purposes of each type.
2-TLH-2	Describe the types of medical personnel, the jobs they perform, and the equipment they use.
2-TLH-3	Describe two uses for each of the five senses.

K-2-ETS1 Engineering Design

K-2-ETS1-1	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-ETS1-2	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-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

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- Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)

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- Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)

Third Grade

Description: The goal of the third grade science program is to provide experiences on a variety of topics in the life, physical, and earth sciences. This level will study: Motion and Stability (forces and interactions), Molecules to Organisms (structures and processes), Ecosystems (interactions, energy, and dynamics), Heredity (inheritance and variation of traits), Biological Evolution (unity and diversity), Earth's Systems, Earth and Human Activity, Engineering Design, and Health topics (body systems, nutrition, hygiene, sleep & exercise, and safety (bicycle, recreation, emergency procedures, and protective behaviors).
Resources Available: Textbooks, thematic books, videos, community-based resources, field trips, video streaming.

Students will be able to:

Motion and Stability

3-PS2-1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
3-PS2-2	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
3-PS2-3	Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
3-PS2-4	Define a simple design problem that can be solved by applying scientific ideas about magnets.*

From Molecules to Organisms

3-LS1-1	Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

Ecosystems

3-LS2-1	Construct an argument that some animals form groups that help members survive.

Heredity

3-LS3-1	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-LS3-2	Use evidence to support the explanation that traits can be influenced by the environment.

Biological Evolution

3-LS4-1	Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
3-LS4-2	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-LS4-3 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-LS4-4 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.*

Earth's Systems

3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.

Earth and Human Activity

3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*

Engineering Design

3-5-ETS1-1 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-ETS1-2 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-ETS1-3 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.

Health

3-TLH-1 Name the purpose for each system of the body

3-TLH-2 Evaluate food according to nutritional value.

3-TLH-3 Participate in the DNR water safety demonstration.

3-TLH-4 Identify and practice safety skills for: fire, tornado, contacting emergency personnel, being home alone, and dealing with strangers.

Engineering Design

3-5-ETS1-1 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-ETS1-2 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-ETS1-3 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.

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.

- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

ETS1.B: Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

ETS1.C: Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

Crosscutting Concepts

Influence of Science, Engineering, and Technology on Society and the Natural World

- People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)
- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)
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Fourth Grade Science

Description: The goal of fourth grade science program is to provide experiences on a variety of topics in the life, physical, and earth sciences. This level will study: Energy, Waves and their applications in technologies for information transfer, Molecules to organisms (structures and processes), Earth's place in the universe, Earth's systems, Earth and human activity, Engineering design, and Health (personal health, nutrition, growth and development, and first aid).

Resources available: textbooks, thematic books, videos, community-based resources, field trips, video streaming, online resources.

The student will be able to:

Energy

4-PS3-1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.
4-PS3-2	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.
4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

Waves and their Applications in Technologies for Information Transfer

4-PS4-1	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
4-PS4-2	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
4-PS4-3	Generate and compare multiple solutions that use patterns to transfer information.

From Molecules to Organisms: Structure and Processes

4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
4-LS2-2	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.

Earth's Place in the Universe

4-ESS1-1	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

Earth Systems

4-ESS2-1	Make observations and/or measurements to provide evidence of

weathering or the rate of erosion by water, ice, wind, or vegetation.

4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.

Earth and Human Activity

4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Engineering Design

3-5-ETS1-1 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-ETS1-2 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- ETS1-3 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.

Health

4-TLH-1 Describe how good hygiene, sleep, fitness, and posture contribute to personal wellness.

4-TLH-2 Prepare a day's worth of meals that meet the requirements of the food pyramid.

4-TLH-3 Describe how to care for senses and body systems.

4-TLH-4 Discuss the physical and emotional changes during adolescence.

4-TLH-5 Explain how the body defends against germs and diseases.

Engineering Design

3-5-ETS1-1 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-ETS1-2 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-ETS1-3 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.

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.

- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

ETS1.B: Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
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ETS1.C: Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

Crosscutting Concepts

Influence of Science, Engineering, and Technology on Society and the Natural World

- People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)
- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

Fifth Grade

Description: The goal of the fifth grade science program is to provide experiences on a variety of topics in the life, physical, and earth sciences. This level will study: Plants (classification, processes, survival), Animals (classification, adaptation), Ecology (biomes, food chain, populations, cycles of life), Weather and Climate (water vapor, clouds, climate factors) Properties of Matter (atoms, elements, compounds, mixtures, solutions, acids & bases, classification), Motion and Energy, Environmental Study, Individual Study, and Health topics (body systems, positive practices, adolescent changes, and simple first aid).

Resources Available: Books (Textbooks, National Geographic, thematic), videos, Guidance Department-health issues, Community-based resources (Camp, Luther, DNR) field trips, video streaming, Internet

The student will be able to:

Matter and Its Interactions

5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.

5-PS1-2 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-PS1-3 Make observations and measurements to identify materials based on their properties.

5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Motion and Stability: Forces and Interactions

5-PS2-1 Support an argument that the gravitational force exerted by Earth on objects is directed down.

Energy

5-PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain warmth) was once energy from the sun.

From Molecules to Organisms: Structures and Processes

5-LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.

Ecosystems: Interactions, Energy, and Dynamics

5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Earth's Place in the Universe

5-ESS1-1 Support an argument that differences in the apparent brightness of sun compared to other stars is due to their relative distance from the Earth.

5-ESS1-2 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.

Earth's Systems

5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS2-2 Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

Earth and Human Activity

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Engineering Design

3-5-ETS1-1 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-ETS1-2 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-ETS1-3 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.

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.

- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

ETS1.B: Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

ETS1.C: Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

Crosscutting Concepts

Influence of Science, Engineering, and Technology on Society and the Natural World

- People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)
- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

Sixth Grade

Description: The goal of the 6th grade science program is to provide a balance of study on topics in life, physical, and earth sciences. This level will study: ecology, water, motion - forces & energy, waves – sound & light, air, first aid, nutrition & dieting, adolescent changes, and environmental issues.

Resources: Glencoe Science 2002, Trees for Tomorrow, Video-streaming, Guidance Department-health issues, Community-based resources (i.e. WPS, TV Meteorologist)

The student will be able to:

Matter and its Interactions

PS1.A-1 Develop models to describe the atomic composition of simple molecules and extended structures.

PS1.A-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

PS1.A-4 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.

Motion and Stability: Forces and Interactions

PS2.A-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

PS2.A-2 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.

Ecosystems: Interactions, Energy, and Dynamics

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

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

LS2.B-3 Develop a model to describe the cycling of matter and the flow of energy among living and nonliving parts of an ecosystem.

The Universe and its' Stars

ESS1.A-1 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.

ESS1.A-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

ESS1.B-1 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.

ESS1.B-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

ESS1.B-3 Analyze and interpret data to determine scale properties of objects in the

solar system.

Earth's Systems

ESS2.A-1	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
ESS2.A-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
ESS2.C-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
ESS2.B-3	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
ESS2.C-4	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
ESS2.C-5	Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
ESS2.C-6	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.
ESS2.D-5	Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
ESS2.D-6	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.

Engineering and Design

ETS1.A-1	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.
ETS1.B-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
ETS1.B-3	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.
ETS1.B-4	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.
ETS1.C-3	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.
ETS1.C-4	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.

Seventh Grade

Course Description: Science 7 is a general science course. It includes units on: Life's Structure, Electricity & Magnetism, Astronomy.

Resources: Glencoe Science 15 Book Series: Life's Structure and Function (A), Astronomy (J), and Electricty & Magnetism (N).
Ancillaries for the Glencoe 15 Book Series,
Laboratory Materials required for Books A, J, & N

The student will be able to:

Physical Sciences:

Chemical Reactions

PS1.B-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

PS1.B-5 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.

PS1.B-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.*

Motion and Stability: Forces and Interactions

PS2.B-3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

PS2.B-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

PS2.B-5 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.

Conservation of Energy and Energy Transfer

PS3.B-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

PS3.B-4 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.

PS3.B-5 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.

Relationship between Energy and Forces

PS3.C-2 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.

Waves and Electromagnetic Radiation

PS4.A-1 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.

PS4.A-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

PS4.B-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

PS4.C-3 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.

Life Sciences:

Structure and Function

LS1.A-1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

LS1.A-2 Develop and use a model to describe the function of a cell as a whole, and ways parts of cells contribute to the function.

LS1.A-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

Growth and Development of Organisms

LS1.B-4 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.

LS1.B-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

LS3.B-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

Organization for Matter and Energy Flow in Organisms

LS1.C-6 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.

LS1.C-7 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.

Organisms and Ecosystems

LS1.D-6 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.

LS1.D-7 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.

Engineering and Design

ETS1.A-1 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.

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

ETS1.B-3 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.

ETS1.B-4 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.

ETS1.C-3 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.

ETS1.C-4 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.

Eighth Grade

Course Description: Science 8 is an integrated science class that covers Chemistry, Rocks & minerals, Processes that shape the Earth's surface and a unit on Bacteria, Fungi & Plants. The course will use reading, lectures, labs as well as group & individual projects

Resources: Textbook: Glencoe 15 book series (the following 5 will be used in Science 8)
The Nature of Matter - Book K
Chemistry - Book L
Earth Materials and Processes - Book F
The Changing Surface of the Earth - Book G
From Bacteria to Plants – Book B

Videos: Various videos will be viewed, including but not limited to: Bill Nye series, The Rock Cycle, The Periodic Table, various Nova Programs.

Web resources including but no limited to:
Science.glencoe.com
Virtual Earthquake
Virtual Stream

The Student will be able to:

Energy

PS3.A-1 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.

PS3.A-2 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.

PS3.A-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*

PS3.A-4 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.

Structure and Properties of Matter

PS1.A-4 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.

Structure, Function, and Information Processing

LS1.D-8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or

storage as memories.

Ecosystems Dynamics, Functioning and Resilience

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

LS2.C-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Inheritance/Variation of Traits

LS3.A-1 & LS3.B-1 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.

LS3.A-2 & LS3.B-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

Evidence of Common Ancestry and Diversity

LS4.A-1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

LS4.A-2 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.

LS4.A-3 Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

Natural Selection

LS4.B-4 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.

LS4.B-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

Adaptation

LS4.C-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Biodiversity and Humans

LS4.D-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

The History of Planet Earth

ESS1.C-4 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.

ESS1.C-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

Natural Resources

ESS3.A-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Natural Hazards

ESS3.B-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Human Impacts on Earth Systems

ESS3.C-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

ESS3.C-4 Construct an argument supported by evidence for how increases in human population and per-capital consumption of natural resources impact Earth’s systems.

Global Climate Change

ESS3.D-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Defining and Delimiting and Engineering Problem

ETS1.A-1 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.

Developing Possible Solutions

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

ETS1.B-3 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.

ETS1.B-4 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.

Optimizing the Design Solution

ETS1.C-3 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.

ETS1.C-4 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.

Ninth Grade Physical Science

Course Description: This course explores the structure of atoms and matter, chemical reactions, motion and forces, and the interactions between matter and energy.

Resources: CINCH Science – On-line science program from Mc Graw Hill PowerPoint presentations, computer cd's, video streaming, other web resources, laboratory materials, etc.

The student will be able to:

Matter and its Interactions

HS-PS1-1 Use the periodic table as a model to predict the relative properties of elements waste on the patterns of the electrons in the outermost energy level of atoms.

HS-PS1-2 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-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of the electrical forces between particles.

HS-PS1-4 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-PS1-5 Apply scientific principles and evidence provide an explanation about the effects of changing the temperature on the rate at which a reaction occurs.

HS-PS1-6 Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

HS-PS1-8 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.

Motion and Stability: Forces and Interactions

HS-PS2-1 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-PS2-2 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-PS2-3 Apply scientific and engineering ideas to, evaluate, and refine a

	device that minimizes the force on a macroscopic object during a collision.
HS-PS2-4	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-PS2-5	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-PS2-6	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

Energy

HS-PS3-1	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-PS3-2	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 positions of particles (objects).
HS-PS3-3	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
HS-PS3-4	Plan and conduct an investigation to provide evidence that a 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-PS3-5	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.

Waves and their Applications in Technologies for Information Transfer

HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
HS-PS4-2	Evaluate questions about the advantages of using a digital transmission and storage of information.
HS-PS4-3	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-PS4-4	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-PS4-5	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.

Earth's Place in the Universe

HS-ESS1-1 Develop a model based on evidence to illustrate the lifespan of the sun and the role from nuclear fusion in the sun's core to release energy in the form of radiation.

HS-ESS1-2 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-ESS1-3 Communicate scientific ideas about the way stars, over their life cycle, produce elements.

HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

HS-ESS1-5 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-ESS1-6 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.

Earth's System

HS-ESS2-1 Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental in ocean floor features.

HS-ESS2-2 Analyze geoscience data to make the claim that one change Earth's surface can create feedbacks that cause changes to other Earth systems.

HS-ESS2-3 Develop a model based on evidence of Earth's interior to describe the cycling of matter a thermal convection.

HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

HS-ESS2-6 Detail of a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

HS-ESS2-7 Construct an argument based on evidence about the simultaneous co-evolution of Earth's systems and life on Earth.

Earth and Human Activity

HS-ESS3-1 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-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.*

HS-ESS3-3 Creates a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human

populations, and biodiversity.

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

HS-ESS3-5 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-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Engineering Design

HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2 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-ETS1-3 Evaluate a solution to a complex real-world problem based on the prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, aesthetics as well as possible social, cultural, and environmental impacts.

HS-ETS1-4 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

Tenth Grade Biology

Course Description: The student will study the major aspects of Biology and how they are related to their life experiences through field observations and studies, group and individual projects and hands on lab experiences.
Specific areas of study:

- Plant Biology
- Ecology
- Cells and cell cycles
- Genetics
- Classifications of life

Resources: Biology – Nowicki Textbook
Various videotapes
Various hands on labs

The student will be able to:

From Molecules to Organisms: Structures and Processes

HS-LS1-1 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-LS1-2 Development and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions with him multicellular organisms.

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

HS-LS1-4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

HS-LS1-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS1-6 Construct and revise and 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-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules our broken and the bonds in new compounds are formed resulting in a net transfer of energy.

Ecosystems: Interactions, Energy, and Dynamics

HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS-LS2-2 Use mathematical representations to support and revise explanations

based on evidence about factors affecting biodiversity in populations in ecosystems of different scales.

HS-LS2-3 Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS-LS2-5 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-LS2-6 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-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-LS2-8 Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

Heredity: Inheritance and Variation of Traits

HS-LS3-1 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-LS3-2 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-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Biological Evolution: Unity and Diversity

HS-LS4-1 Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-2 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-LS4-3 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-LS4-4 Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-LS4-5 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-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

Engineering Design

HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2 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-ETS1-3 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-ETS1-4 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.

Chemistry

This course deals with the structure of matter, relationships between energy and chemical reactions, and lab work illustrating and emphasizing these principles. Problem solving using terminology and chemical symbols is emphasized, therefore a good background in Algebra I is required.

Resources: Textbook: Chemistry, Matter and Change, Glencoe Science, 2008, powerpoint presentations, computer cd's, video streaming, other web resources, laboratory materials, etc.

The student will able to:

Matter and Its Interactions

HS-PS1-1	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.
HS-PS1-2	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-PS1-1	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-PS1-4	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-PS1-5	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-PS1-6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
HS-PS1-7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
HS-PS1-8	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-PS3-1	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.

Energy

HS-PS3-3	Design, build, and refine a device that works within given restraints to convert one form of energy into another form of energy.
HS-PS3-4	Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are

combined within a closed system results in a more uniform energy distribution among the components in the system.

Waves and their Applications in Technologies for Information Transfer

HS-PS4-5 Communicate technical information about how some technological devices use the principle of wave behavior and wave interactions with matter to transmit and capture information and energy.

Earth's Place in the Universe

HS-ESS1-1 Develop a model based on evidence to illustrate the lifespan of the sun and the role from nuclear fusion in the sun's core to release energy in the form of radiation.

HS-ESS1-5 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-ESS1-6 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.

Earth's System

HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effect on Earth materials and surface processes.

HS-ESS2-6 Detail of a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

HS-ESS3-1 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-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit rations.

HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional change and associated future impacts to Earth systems.

HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Engineering Design

HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2 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-ETS1-3 Evaluate a solution to a complex real-world problem based on the prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS1-4 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.

Ecosystems: Interactions, Energy, and Dynamics

HS-LS2-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

Physics

This is a traditional physics course concentrating on problem solving in units on mechanics, periodic motion, heat, sound, light, waves, magnetism, electricity. Lab work is done in all units to reinforce the fact that physics is an experimental science as well as theoretical.

Resources: Texbook: Physics, Principles and Problems, Glencoe Science, 2005, powerpoint presentations, computer cd's, video streaming, other web sources, laboratory materials, etc.

The student will be able to:

Motion and Stability: Forces and Interactions

HS-PS2-1	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-PS2-2	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-PS2-3	Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.
HS-PS2-4	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-PS2-5	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-PS2-6	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

Energy

HS-PS3-1	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-PS3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).
HS-PS3-3	Design, build, and refine a device that works within given restraints to convert one form of energy into another form of energy.
HS-PS3-4	Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system.

HS-PS3-5 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.

Waves and their Applications in Technologies for Information Transfer

HS-PS4-1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

HS-PS4-2 Evaluate questions about the advantages of using a digital transmission and storage of data.

HS-PS4-3 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-PS4-4 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-PS4-5 Communicate technical information about how some technological devices use the principle of wave behavior and wave interactions with matter to transmit and capture information and energy.

Earth's Place in the Universe

HS-ESS1-1 Develop a model based on evidence to illustrate the lifespan of the sun and the role from nuclear fusion in the sun's core to release energy in the form of radiation.

HS-ESS1-2 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-ESS1-3 Communicate scientific ideas about the way stars, over their life cycle, produce elements.

HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

HS-ESS1-5 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.

Earth's System

HS-ESS2-1 Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental in ocean floor features.

HS-ESS2-2 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-ESS2-3 Develop a model based on evidence of Earth's interior to describe the cycling of matter in thermal convection.

HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out

of Earth's systems result in changes in climate.

Engineering Design

HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2 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-ETS1-3 Evaluate a solution to a complex real-world problem based on the prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS1-4 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.

Global Science

Course Description: This course will cover the topics involving conservation, environmental issues, outdoor education, natural resource use and management, energy sources and local issues. This course is taught through research projects, individual research, and hands on activities to show mastery or related skills.

Resources: Internet resources, guest speakers, state and local contacts

Objective: To engage students in the understanding of our environment and the use and misuse of its' natural resources.

Global Science Projects Parameters: Must relate to the environment, energy, and/or natural resources

Each 3 week grading period:

- must earn at least: 270 pts for an "A", 240 pts for a "B", or 210 pts for a "C"
- no more than 2 PowerPoint presentations

Each Quarter:

- must earn at least: 810 pts for an "A", 720 pts for a "B", or 630 pts for a "C"
- projects must include at least one written report (3 page minimum)

Each Semester:

- Projects must include at least one research project in which you carried out an experiment

Spring (2nd) Semester:

- At least one project must be an "Earth Day" project that promotes saving the environment. This will be due on or before April 22

Advanced Placement Biology

Course Description: A.P. Biology is an advanced course in biology. The goal of the class is to prepare the student for the College Board's A.P. Biology test. The course covers: molecules and cells, heredity and evolution, and organisms and populations.

Resources: Biology – Campbell, Reece, Mitchell
A.P. Lab manual & guides

No.	Objective	% Of course
1	Describe the relationship of the atomic structure of water to its properties and how those properties are important to all living things.	15%
2	Identify the four major groups of organic molecules, their structures and relate them to their function in living things	
3	Compare and contrast prokaryotic and eukaryotic cells	15%
4	Describe the structure and functions of the cell membrane as well as its importance to living things.	
5	List the major steps of the cell cycle and how it is controlled.	
6	Describe the cellular energetics as it related to cellular respiration, fermentation, photosynthesis, and coupled reactions.	10%
7	Relate meiosis and gametogenesis to the variation in a species.	10%
8	Describe the structure and function of the eukaryotic chromosome.	
9	Explain the major inheritance patterns and how they contribute to the variation of a species and diversity of organisms	
10	Describe the structure and function of RNA & DNA and how they relate to the processes of replication, translation, and transcription.	10%
11	Explain several methods cell use to regulate the expression of genes.	
12	Describe how mutations can occur and how the contribute to the variation and diversity of species.	
13	Describe several ways DNA technology is used today.	
14	Explain the current theories of the origin of the Earth and the life on it.	20%
15	Describe the major evidence for the evolution of life	
16	List the mechanisms of evolution	
17	Explain the patterns of evolution and they relate to the diversity of species	
18	Describe several evolutionary relationships	
19	Relate the structure and function of plants as to their reproduction, growth, and development.	20%

20	Relate the structure and function of plants as to their reproduction, growth, and development.	

Integrated Science

Course Description: Integrated Science pulls principles from several different sciences – earth science, physical science, biology, chemistry, and physics – to study themes and phenomena from the world around us. Real life problems and projects will be studies and completed to demonstrate the interaction of scientific principles. Students will focus on designing and performing experiments to test ideas, and then analyzing and presenting findings.

Resources: Internet resources, various books, research contacts.