West Essex Consortium Curriculum
Essex Fells, Fairfield, North Caldwell, Roseland
Science Department

I. COURSE NAME: Science 5

II. COURSE PREREQUISITES: Science 4

III. GRADE LEVEL(S): 5

IV. COURSE DESCRIPTION:

The performance expectations in fifth grade help students formulate answers to questions such as: “When matter changes, does its weight change? How much water can be found in different places on Earth? Can new substances be created by combining other substances? How does matter cycle through ecosystems? Where does the energy in food come from and what is it used for? How do lengths and directions of shadows or relative lengths of day and night change from day to day, and how does the appearance of some stars change in different seasons?” Fifth grade performance expectations include PS1, PS2, PS3, LS1, LS2, ESS1, ESS2, and ESS3 Disciplinary Core Ideas from the NRC Framework. Students are able to describe that matter is made of particles too small to be seen through the development of a model. Students develop an understanding of the idea that regardless of the type of change that matter undergoes, the total weight of matter is conserved. Students determine whether the mixing of two or more substances results in new substances. Through the development of a model using an example, students are able to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. They describe and graph data to provide evidence about the distribution of water on Earth. Students develop an understanding of the idea that plants get the materials they need for growth chiefly from air and water. Using models, students can describe the movement of matter among plants, animals, decomposers, and the environment and that energy in animals’ food was once energy from the sun. Students are expected to develop an understanding of patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. The crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; energy and matter; and systems and systems models are called out as organizing concepts for these disciplinary core ideas.

V. COURSE OBJECTIVES:

In the fifth grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, engaging in argument from evidence, and obtaining, evaluating, and communicating information; and to use these practices to demonstrate understanding of the core ideas.

VI. TEXTS/RESOURCES

A. Textbook

B. www.NSTA.org

C. www.nextgenscience.org

VII. EVALUATIONS/ASSESSMENTS

A combination of formative and summative assessments will be utilized in this course including, but not limited to teacher observations, student work and reflections, projects, quizzes and tests, and writing tasks.

VIII. SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

Scope and Sequence of Content and Skills for Science 5

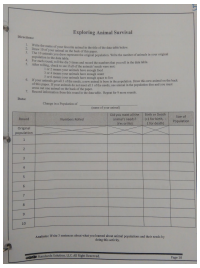
Unit Name	Earth's Place in the Universe (Forces integrated)
Estimated Timeline	February - April
Essential Questions	• If an object is initially stationary, why does it move downward when released? • Why do some stars appear brighter in the night sky? • How do objects move in space? • What patterns are created by Earth's orbit around the sun? • How and why does your shadow change during the day?
NGSS	5-PS2-1 5-ESS1-1 5-ESS1-2 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3
Student Learning Objectives	• Support an argument that the gravitational force exerted by Earth on objects is directed down towards the planet's center. • Support an argument that difference in the apparent brightness of the sun compared to other stars is due to their relative distance from Earth. • 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. • Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. • Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. • Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Suggested projects, activities, labs used to support content, and resources	● Students construct a size-distance scale model of the solar system (distance scale limited to distance from the sun to Earth). Given a model sun, students will make predictions of the size of Earth in relation to the model sun. The students will locate Earth's distance from the sun. ○ http://www.exploratorium.edu/ronh/solar_system/ ● Students will use their bodies and movements to model the relationship between time and astronomical motions of Earth (rotation on its axis and orbit around the sun) as well as how these motions affect our view of objects in the sky at various times of day and year. Earth's rotation causes day and night as well as the daily pattern of the sun's apparent motion and altitude relative to the horizon. ○ Earth's Tilt ○ Earth's Tilt 2 ○ Earth's Orbit Simulation Website ● Students will use a light and moon model to determine the phases of the moon, and make a phases of the moon chart to summarize their results. ● Kids Discover: Galaxies ● iPad app: Solar Walk ● Life and Death of a Star ● Extend: Planet Research Paper ● Shadow Shifting*: Students will trace their shadows in the morning and afternoon, and compare tracings. They will use this information to determine the position of the Sun as it appears to move throughout the day. ● Sun Tracking*: Students will construct Sun trackers. After using a compass to orient the Sun tracker north-south, students make hourly records of the position of the tip of the shadow cast by a golf tee. ● Gravity Experiment Lesson: https://nj.pbslearningmedia.org/resource/phy03.sci.phys.mfe.lp_gravity/gravity-and-falling-objects/#.WRtEXvkrLcs
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist

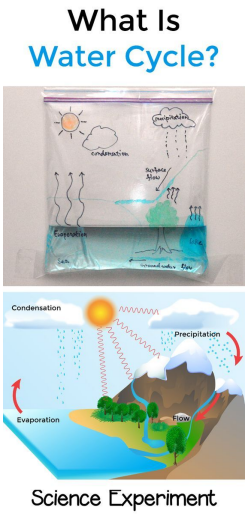
Unit Name	Matter and Its Interactions
Estimated Timeline	April - June
Essential Questions	● What makes up matter? ● Does matter still exist if you cannot see it? ● How can matter be broken down? ● How is matter affected when it changes form? ● Describe the properties of matter. ● What is the difference between a physical change and a chemical change? ● How are mixtures separated?
NGSS	5-PS1-1 5-PS1-2 5-PS1-3 5-PS1-4 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3
Student Learning Objectives	● Develop a model to describe that matter is made of particles too small to be seen. ● 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. ● Make observations and measurements to identify materials based on their properties. ● Conduct an investigation to determine whether the mixing of two or more substances results in new substances. ● Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. ● Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
Suggested projects, activities, labs used to support content, and resources	● Separating a Mixture*: Students will be given a mixture of gravel, powder, salt, and magnetite. Students will use screens, filters, magnets, and evaporation dishes to separate the mixture, without being told what the mixture consists of. ● Saturation*: Students will saturate three 50 mL bottles of water with salt, Epsoms salt, and citric acid. Students will use solubility and crystals shape (through evaporation) to identify the three materials. ● Chemical Reactions*: Students will use three substances (calcium chloride, baking soda, and citric acid) to make three different combinations of two substances. They will add water and observe

	the changes that occur. The new products that form (a gas and a white precipitate) are identified as evidence of a chemical reaction. ● Reaction Products*: Students will use filtering and evaporation to separate the products of the chemical reactions listed above and identify the products by testing with vinegar (chalk) and evaporation (salt) to identify the products. ● Conservation of Mass: Students will use a balance and mass pieces to show that matter is conserved when making a salt water solution. ● Students will sort and categorize cards of different images of matter. The goal is to get students to identify solid, liquid, and gas. ● http://www.strangematterexhibit.com/index.html ● Mystery Matter (https://api.betterlesson.com/mtp/lesson/641976/print): Students recieve a bag with a mystery item in it. They will have to gather data on the properties of matter in order to present it to the class. ● Mystery Powder Investigation: Students observe the chemical properties of matter. ● Mixing Substances Investigation: Students conduct experiments to tell if mixing two or more substances will result in a new substance. *Students will need to know the difference between physical and chemical changes.* ● Trap and Store: Students will stimulate a smoke stack by combining vinegar and baking soda. Working as a team, they will design, build, and test a way to collect the carbon dioxide that their smoke stack releases. (Interactive Science p. 4) http://interactivesites.weebly.com
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist

Unit Name	Ecosystems (Energy & Molecules to Organism: Structure & Processes infused)
Estimated Timeline	September - November
Essential Questions	● How do plants get the food they need? ● What factors determine how animals meet their basic needs? ● How are the components that make up an ecosystem interdependent? ● How does matter and energy transfer and cycle within an ecosystem? ● What are the components and interactions within a given ecosystem?
NGSS	5-LS2-1 5-PS3-1 5-PS3.D 5-LS1-1 LS1.C LS2.A LS2.B
Student Learning Objectives	● Use models to describe that energy in animals' food was once energy from the sun. ● Justify that animals' food is used for body repair, growth, motion, & to maintain body warmth. ● Defend that energy can be transferred in various ways and between objects. ● Develop a model to demonstrate phenomena of mechanisms for natural events. ● Construct a model that represents the interdependent relationships in an Ecosystem. ● Create a representation of matter and energy transfer in an ecosystem. ● Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. ● Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
Suggested projects, activities, labs used to support content, and resources	● Plant nutrition*: Students will plant wheat seeds in a dark environment and a light environment to observe that plants get the materials they need for growth mainly from air and water. ● Food Chain Digital Challenges:

	https://ecokids.ca/swf-files/gamesPage/chain_reaction.swf http://www.iknowthat.com/ScienceIllustrations/foodchains/science_desk.swf ● Interactions of Living things: http://cashmancuneo.net/flash/fc44/foodchain.swf ● Ecosystem Design Challenge: Students design and create a model of a sustainable environment for a specific organism. ● Conduct research to create a food web utilizing technology software, Inspiration. ● Food Fight Game: Digitally build an environment in which animals complete for resources: https://www.brainpop.com/games/foodfight/Ecogame.swf ● Research Endangered Species: http://www.kidsplanet.org/factsheets/map.html ● Exploring Animal Survival Activity 
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist

Unit Name	Earth's Systems (Human Activity infused)
Estimated Timeline	December - March
Essential Questions	● What are Earth's major systems? ● What is the water cycle? ● How do oceans influence climate? ● How do mountain ranges influence climate? ● How is Earth's water distributed? ● How do Earth's systems interact? ● How does Earth's surface change? ● What are the positive and negative effects of human activity on the environment?
NGSS	5-ESS2-1 5-ESS2-2 5-ESS3-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3
Student Learning Objectives	● Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. ● Describe and graph the amounts of saltwater and freshwater in various reservoirs to provide evidence about the distribution of water on Earth. ● Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. ● Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. ● Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. ● Research an environmental issue, steps that have already been done to correct it, and activities 5th graders could do to help it.
Suggested projects, activities, labs used to support content, and resources	● Students will be given data for pairs of cities with similar latitude, with one city being closer to the ocean. They will analyze the data to determine the effect of proximity to an ocean on climate. * ● Students will be given data for pairs of cities, with one city being in

	the rain shadow of a mountain range. They will analyze the data to determine the effect of mountain ranges on climate. ● Students will model distribution of Earth's water using different size beakers and graduated cylinders. They will then make a graph (pie, bar, etc.) to show the distribution of water on earth. * ● Students will design a prototype to convert saltwater to freshwater. Provide criteria and constraints for prototype. ● Students will construct a model to show the interaction between two of earth's systems. ● FOSS Water Cycle Game ● Water Cycle Model  Science Experiment ● Water Filtration Challenge https://www.jpl.nasa.gov/edu/teach/activity/water-filtration-challenge/ ● Environmental Concerns Project/presentation
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist