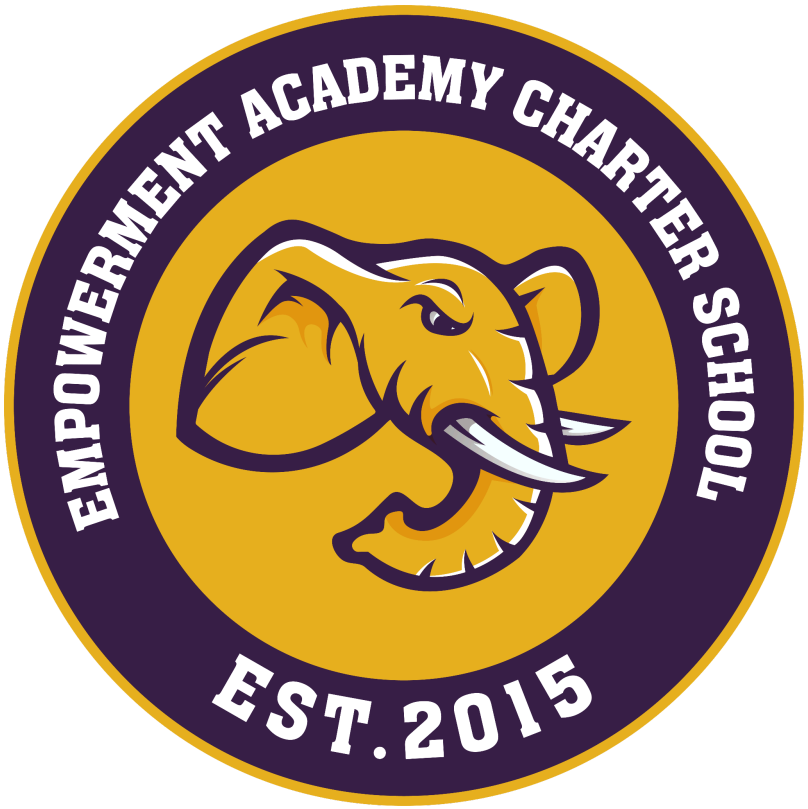
Empowerment Academy Charter School

Elementary Science Curriculum



Science At Empowerment

COURSE DESCRIPTION

The science program at Empowerment Academy Charter School is designed to prepare all students for their future in the 21st century and offer skills and strategies to be a successful member of their community. Based on the Next Generation Science Standards and the New Jersey Learning Standards for Science, science at Empowerment Academy is designed to explore the sciences (Earth, Life, and Physical) from Kindergarten through Grade 4. At Empowerment, we license FOSS (Full Option Science System) with additional resources created to supplement material to solidify student understanding throughout the units. FOSS is a:

> research-based science curriculum for grades K-8 developed at the Lawrence Hall of Science, University of California, Berkeley. FOSS has evolved from a philosophy of teaching and learning that has guided the development of successful active-learning science curricula for more than 40 years. The FOSS Program bridges research and practice by providing tools and strategies to engage students and teachers in enduring experiences that lead to deeper understanding of the natural and designed worlds. (*©2023 School Specialty, Inc. All rights reserved.*)

COURSE RESOURCES

- Full Option Science System, FOSS (Delta Education & School Specialty)
- BrainPop

FOSS K-4 SCOPE & SEQUENCE

	Kindergarten	1st Grade	2nd Grade	3rd Grade	4th Grade
Earth Science	**Trees & Weather** November - December	**Air & Weather** November - January	**Pebbles, Sand & Silt** November - January	**Water & Climate** November - December	**Soils, Rocks & Landforms** November - December
Physical Science	**Materials & Motion** January - March	**Sound & Light** January - February	**Solids & Liquids** January - February	**Motion & Matter** January - February	**Energy** December - January
Life Science	**Animals Two by Two** December - January	**Plants & Animals** February - March	**Insects & Plants** February - March	**Structures of Life** February - March	**Environments Living Systems** February - March

updated 2024-2025
subject to change

ASSESSMENTS

Formative Assessments	Summative Assessments	Alternative Assessments
• Class Participation • Class Discussions • Classwork Assignments	• Quizzes • Unit Assessments • Interim Assessments	• Projects

INTEGRATED ACCOMMODATIONS & MODIFICATIONS

Special Education Students	English Language Learners	At Risk Students	504 Students	Gifted & Talented Students
• Preferential Seating • Provide adjusted time/length of assignments • Provide study guides for assessments • Provide graphic organizers • Frequent checks for understanding • Use of a calculator (if appropriate) • Use of manipulatives	• Link concepts to students' background and experiences • Use speech appropriate for students' proficiency level • Provide translated materials and/or audio versions of text (when appropriate)	• Preferential seating • Accept late work without penalty • Task list for routines/procedures on desk • Provide graphic organizers • Provide access to accurate notes	• Incorporate student choice • Provide graphic organizers • Provide adjusted time/length of assignments	• Incorporate student choice • Incorporate independent studies/projects

updated 2024-2025
subject to change

Kindergarten Science

COURSE DESCRIPTION

Based on the Next Generation Science Standards and the New Jersey Learning Standards for Science, science at Empowerment Academy is designed to explore the sciences (Earth, Life, and Physical) beginning in Kindergarten. Using the FOSS curriculum as a foundation, students engage in hands-on, real life applications of science concepts. By the end of Kindergarten, students will learn that trees are plants that live and grow through the seasons, that objects are made of materials and the properties of those materials determine their use, that objects can move (i.e. through pushes and pulls), and about animals and their survival needs.

OVERVIEW BY UNIT

Units 3 & 4: Trees & Weather **Timeline:** *November - December*	
Unit Overview	**Unit 3:** In this Unit, students engage with the phenomenon of leaves. Students begin with a schoolyard walk, focusing on the leaves of trees. They match leaves with geometric shapes, go on a leaf hunt to compare properties of leaves, work at centers with representational materials, and make a leaf book. This investigation concludes with a story, Our Very Own Tree. Students engage with the phenomenon of trees. Students begin their study of trees by looking at the variety and structure of trees in the schoolyard. They work with representational materials to look more closely at the shapes of trees and their parts. They adopt schoolyard trees to observe changes through the year. A living tree becomes part of the classroom for several weeks, and students complete the investigation by planting their class tree on the school grounds. **Unit 4:** In this unit, students enhance their understanding of the needs of plants and animals for survival as well as the relationship between these needs and their habitats. Students track local weather, and observe patterns and variations and gain insight into the significance for forecasts for preparing for extreme weather events. Students actively engage in scientific and engineering practices, including posing questions, collaborating on investigations, observing, recording, and analyzing data to formulate explanations.
Essential Questions	• What do trees need to live and grow? • How does weather affect trees?

	● What changes to trees cause in their surroundings?
Science Standards	● **K-ESS2-1:** Use and share observations of local weather conditions to describe patterns over time. ● **K-ESS2-2:** Construct an argument supported by evidence for how plants and animals (including humans) can change ● the environment to meet their needs. ● **K-ESS3-3-1:** 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 climate change and humans on the land, water, air, and/or other living things in the local environment. ● **K-PS3-2:** Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area
Science & Engineering Practices (SEP)	● **Analyzing and Interpreting Data** ○ Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. (K-ESS2-1) ● **Engaging in Argument from Evidence** ○ Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s). (K-ESS2-2) ● **Asking Questions and Defining Problems** ○ Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. (K-ESS3-2) ● **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, storyboard) that represent concrete events or design solutions. (K-ESS3-1) ● **Obtaining, Evaluating, and Communicating Information** ○ Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. (K-ESS3-2, K-ESS3-3)

Disciplinary Core Ideas (DCI)	● **ESS2.D: Weather and Climate** ○ Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1) ● **ESS2.E: Biogeology** ○ Plants and animals can change their environment. (K-ESS2-2) ● **ESS3.C: Human Impacts on Earth Systems** ○ Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (secondary to K-ESS2-2) ● **ESS3.A: Natural Resources** ○ Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1) ● **ESS3.B: Natural Hazards** ○ Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K-ESS3-2) ● **ESS3.C: Human Impacts on Earth Systems** ○ Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (K-ESS3-3) ● **ETS1.A: Defining and Delimiting an Engineering Problem** ○ Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-ESS3-2) ● **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. (secondary to K-ESS3-3)
Crosscutting Concepts (CCC)	● **Patterns** ○ Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1)

	● **Systems and System Models** ○ Systems in the natural and designed world have parts that work together. (K-ESS3-1, K-ESS2-2) ● **Science Knowledge is Based on Empirical Evidence** ○ Scientists look for patterns and order when making observations about the world. (K-ESS2-1) ● **Cause and Effect** ○ Events have causes that generate observable patterns. (K-ESS3-2),(K-ESS3-3) ● **Interdependence of Science, Engineering and Technology** ○ People encounter questions about the natural world every day. (K-ESS3-2) ● **Influence of Engineering, Technology, and Science on Society and the Natural World** ○ People depend on various technologies in their lives; human life would be very different without technology. (K-ESS3-2)
Units 5 & 6: Animals Two by Two **Timeline:** *December - January*	
Unit Overview	**Unit 5:** In this Unit, students first engage with the phenomenon of fish. Students observe the structures and behaviors of goldfish. They feed the fish and enrich the environment in which the fish live. They compare the structures and behaviors of the goldfish to those of other fish, guppies. Students compare photos of fish and read about fish. Students then engage with the phenomenon of local birds. They go bird watching in the schoolyard and compare features and behaviors of birds. **Unit 6:** In this Unit, students engage with the phenomenon of snails. Students observe the structures and behaviors of two kinds of water snails. Students work with a variety of seashells, discussing similarities and differences in their size, shape, color, and texture. Students match shell pairs, make designs, and create patterns. Students explore the schoolyard to find local land snails and compare their structures and behaviors to water snails. Students engage with the phenomenon of earthworms. Students dig for redworms, rinse them off, and look at their structures. They study their behavior. They construct worm jars and provide for the needs of the composting worms. Students observe how the worms change the plant material into soil. They compare the redworms to night crawlers, which are much larger. Students compare photos and read about worms and their activities in soil.

Essential Questions	● How are animal structures similar and different? ● What do animals need to live and grow?
Science Standards	● **K-LS1-1:** Use observations to describe patterns of what plants and animals (including humans) need to survive
Science & Engineering Practices (SEP)	● **Analyzing and Interpreting Data** ○ Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. (K-LS1-1)
Disciplinary Core Ideas (DCI)	● **LSC1.C: Organization for Matter and Energy Flow in Organisms** ○ All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)
Crosscutting Concepts (CCC)	● **Patterns** ○ Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-LS1-1) ● **Science Knowledge is Based on Empirical Evidence** ○ Scientists look for patterns and order when making observations about the world. (K-LS1-1)
Units 7 & 8: Materials & Motion **Timeline:** *January - March*	
Unit Overview	**Unit 7:** In this Unit, students observe and compare the properties of ten kinds of paper and go on a hunt for matching samples. They compare how well the papers fold and which has the best surface for writing. They test papers for absorption, then soak the samples overnight. Students learn how to recycle paper by making new paper from old and crafting paper-mâché bowls. **Unit 8:** In this Unit, students investigate the strength of pushes and pulls needed to move objects. They use gravity to pull balls down slopes to investigate collisions. Students find ways to change the strength and direction of the pull on a rolling ball to meet design challenges. Students change the strength of the push on a balloon rocket

	flying on a line to explore cause and effect.
Essential Questions	● What is made of wood, paper, and fabric? ● How are the properties of those useful to us? ● How can we change the motion of an object?
Science Standards	● **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-PS3-1:** 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 ● **K-2 ETS1-1:** Ask questions, make observations, and gather information about a situation people want to change (e.g., climate 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 & Engineering Practices (SEP)	● **Planning and Carrying Out Investigations** ○ Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. (K-PS2-1, K-PS3-1) ● **Analyzing and Interpreting Data** ○ Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. (K-2 ETS1-3, K-PS2-2) ● **Asking Questions and Defining Problems** ○ Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. (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, storyboard) that represent concrete events or design solutions. (K-2 ETS 1-2) ● **Constructing Explanations and Designing Solutions** ○ Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. (K-PS3-2)
Disciplinary Core Ideas (DCI)	● **PS2.A: Forces and Motion** ○ Pushes and pulls can have different strengths and directions. (K-PS2- 1, K-PS2-2) ○ Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it (K-PS2-1, K-PS2-2) ● **PS2.B: Types of Interactions** ○ When objects touch or collide, they push on one another and can change motion. (K-PS2-1) ● **PS3.C: Relationship Between Energy and Forces** ○ A bigger push or pull makes things speed up or slow down more quickly. (K-PS2-1) ● **ETS1.A: Defining Engineering Problems** ○ A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (K-PS2-2) ● **ETS1.A: Defining and Delimiting Engineering Problem**s ○ A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2- ETS1-1) ○ Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2- ETS1-1) ○ 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, such as climate change, 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) ● **PS3.B: Conservation of Energy and Energy Transfer** ○ Sunlight warms Earth's surface. (K-PS3-1, K-PS3-2)
Crosscutting Concepts (CCC)	● **Structure and Function** ○ The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2) ● **Cause and Effect** ○ Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2-1, K-PS2-2, K-PS3-1, K-PS3-2) ● **Scientific Investigations Use a Variety of Methods** ○ Scientists use different ways to study the world. (K-PS2-1, K-PS3-1)

1st Grade Science

COURSE DESCRIPTION

Based on the Next Generation Science Standards and the New Jersey Learning Standards for Science, science at Empowerment Academy is designed to build on the foundation of the sciences (Earth, Life, and Physical) that students have learned beginning in Kindergarten. Using the FOSS curriculum as a foundation, students engage in hands-on, real life applications of science concepts. By the end of Grade 1, students will have learned about the air around them and the natural objects that are seen in the sky, sound and light and the interactions we have with them, and the structures that help plants and animals grow and survive.

OVERVIEW BY UNIT

Units 4 & 5: Air and Weather **Timeline:** *November - January*	
Unit Overview	**Unit 4:** In this Unit, students explore properties of a common gas mixture—air. Using vials, syringes, and tubing, students experience air as matter, discovering that it takes up space and can be compressed, and that compressed air builds up pressure that can push objects around. They construct and compare parachutes and balloon rockets that use air. **Unit 5:** In this Unit, students turn their focus upward. The anchor phenomena are the air that surrounds us and the natural objects that we see in the sky. Students explore the phenomenon that objects in the sky change position in predictable ways. They explore the natural world by using simple instruments and calendars to observe and monitor change. They use new tools and methods to build on their understanding of the weather and to find out about properties of air by exploring how objects interact with air. The driving question for the module is what is all around us and what do we observe in the sky above us?
Essential Questions	• What is all around us? • WHat do we observe in the sky above us?
Science Standards	• **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.

	● **K-2 ETS1-1:** Ask questions, make observations, and gather information about a situation people want to change (e.g., climate 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 & Engineering Practices (SEP)	● **Analyzing and Interpreting Data** ○ Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. (K-2 ETS1-3, 1-ESS1-1) ● **Asking Questions and Defining Problems** ○ Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. (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, storyboard) that represent concrete events or design solutions. (K-2 ETS 1-2) ● **Planning and Carrying out Investigations** ○ Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. (1-ESS1-2)
Disciplinary Core Ideas (DCI)	● **ETS1.A: Defining and Delimiting Engineering Problem**s ○ A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2- ETS1-1) ○ Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2- ETS1-1) ○ 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, such as climate change, 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) ● **ESS1.A: The Universe and its Stars** ○ Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1) ● **ESS1.B: Earth and the Solar System** ○ Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)
Crosscutting Concepts (CCC)	● **Structure and Function** ○ The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2) ● **Patterns** ○ Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1, 1-ESS1-2) ● **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** ○ Science assumes natural events happen today as they happened in the past. (1-ESS1-1) ○ Many events are repeated. (1- ESS1-1)
Units 6 & 7: Light & Sound **Timeline:** *January - February*	
Unit Overview	**Unit 6:** In this Unit, students observe the phenomenon of sound using a table fiddle, tuning forks, a tone generator, cups, sticks, and rubber bands. Students look for vibrations at the sound source and come up with words to describe different sounds. They learn how to discriminate between different kinds of sounds and what information sounds convey. Students find out about sounds that different animals make. **Unit 7:** In this Unit, students observe the phenomenon of sound using a table fiddle, tuning forks, a tone generator,

	cups, sticks, and rubber bands. Students look for vibrations at the sound source and come up with words to describe different sounds. They learn how to discriminate between different kinds of sounds and what information sounds convey. Students find out about sounds that different animals make.
Essential Questions	● How do sound and light interact with objects?
Science Standards	● **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 uses light or sound to solve the problem of communicating over a distance. ● **K-2 ETS1-1:** Ask questions, make observations, and gather information about a situation people want to change (e.g., climate 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 & Engineering Practices (SEP)	● **Analyzing and Interpreting Data** ○ Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. (K-2 ETS1-3, K-PS2-2) ● **Asking Questions and Defining Problems** ○ Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. (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, storyboard) that represent concrete events or design solutions. (K-2 ETS 1-2) ● **Planning and Carrying out Investigations** ○ Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. (1-PS4-1, 1-PS4-3) ● **Construction Explanations and Designing Solutions** ○ Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. (1-PS4-2, 1-PS4-4)
Disciplinary Core Ideas (DCI)	● **PS4.A: Wave Properties** ○ Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) ● **PS4.B: Electromagnetic Radiation** ○ Objects can be seen if light is available to illuminate them or if they give off their own light. (1- PS4-2) ○ Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (1-PS4-3) ● **PS4.C: Information Technologies and Instrumentation** ○ People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) ● **ETS1.A: Defining and Delimiting Engineering Problem**s ○ A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2- ETS1-1) ○ Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2- ETS1-1) ○ 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, such as climate change, 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 (CCC)	● **Cause and Effect** ○ Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1, 1-PS4-2, 1-PS4-3) ● **Structure and Function** ○ The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2) ● **Influence of Engineering, Technology, and Science, on Society and the Natural World** ○ People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4) ● **Scientific Investigations Use a Variety of Methods** ○ Science investigations begin with a question. (1-PS4-1) ○ Scientists use different ways to study the world. (1-PS4-1)
Units 8 & 9: Plants & Animals **Timeline:** *February - March*	
Unit Overview	**Unit 8:** In this Unit, students set up terrariums using seeds and plants from Investigations 1 and 2. They add local animals such as snails and isopods and provide for the needs of the plants and animals. Students learn about other animals and plants through readings and multimedia and compare and sort structures and functions. Through an outdoor simulation, students learn about variations in how squirrels store food for winter survival. Students read about how engineers learn from nature to solve human problems. **Unit 9:** In this Unit, students plant bulbs in moist cotton and observe and describe the phenomenon of young plant development. They plant parts of roots—carrots and radishes—to discover which parts will develop into new plants and compare young to parent plants. Students adopt a schoolyard plant and compare it to other plants. They use media to learn about how behaviors of animals help their young to survive. Students describe the

	phenomenon of how young organisms resemble their parents.
Essential Questions	● How do young plants and animals survive in their habitat?
Science Standards	● **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. ● **1-LS3-1**: Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. ● **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.
Science & Engineering Practices (SEP)	● **Constructing Explanations and Designing Solutions** ○ Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. (1-LS1-1, 1-LS3-1) ● **Obtaining, Evaluating, and Communicating Information** ○ Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. (1-LS1-2) ● **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, storyboard) that represent concrete events or design solutions. (K-2 ETS 1-2)
Disciplinary Core Ideas (DCI)	● **LS1.A: Structure and Function** ○ All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1) ● **LS1.B: Growth and Development of Organisms**

	○ Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2) ● **LS1.D: Information Processing** ○ Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1) ● **LS3.A: Inheritance of Traits** ○ Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (1- LS3-1) ● **LS3.B: Variation of Traits** ○ Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1) ● **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, such as climate change, to other people. (K-2-ETS1-2)
Crosscutting Concepts (CCC)	● **Structure and Function** ○ The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2, 1-LS1-1) ● **Patterns** ○ Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2, 1-LS3-1) ● **Influence of Engineering, Technology, and Science on Society and the Natural World** ○ Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1) ● **Scientific Knowledge is Based on Empirical Evidence** ○ Scientists look for patterns and order when making observations about the world. (1-LS1-2)

2nd Grade Science

COURSE DESCRIPTION

Based on the Next Generation Science Standards and the New Jersey Learning Standards for Science, science at Empowerment Academy is designed to build on the foundation of the sciences (Earth, Life, and Physical) that students have learned beginning in Kindergarten. Using the FOSS curriculum as a foundation, students engage in hands-on, real life applications of science concepts. By the end of Grade 2, students learn about the materials that cover the surface of our planet, matter in two phases- solid and liquid, and the natural history of insects and how they interact with plants.

OVERVIEW BY UNIT

Units 3 & 4: Pebbles, Sand & Silt **Timeline:** *November - January*	
Unit Overview	**Unit 3:** In this Unit, students engage with the anchor phenomenon of earth materials that cover the planet's surface. They observe the properties of rocks of various sizes and study the components of soil, study the results of weathering and erosion, locate natural sources of water, and determine how to represent the shapes and kinds of land and bodies of water on Earth. The driving questions are what are the properties of earth materials? and how do they interact and change? **Unit 4:** In this Unit, students learn how people use earth materials to construct objects. They make rubbings from sandpaper, sculptures from sand, decorative jewelry from clay, and bricks from clay soil. They go on a schoolyard field trip to look for places where earth materials occur naturally and where people have incorporated earth materials into building materials. Students discover that rock as a resource is a natural phenomenon occurring in predictable locations all over Earth's surface.
Essential Questions	• What are the properties of Earth materials? • How do Earth materials interact and change?
Science Standards	• **2-ESS1-1**: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

	● **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. ● **K-2 ETS1-1:** Ask questions, make observations, and gather information about a situation people want to change (e.g., climate 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 & Engineering Practices (SEP)	● **Analyzing and Interpreting Data** ○ Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. (K-2 ETS1-3) ● **Asking Questions and Defining Problems** ○ Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. (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, storyboard) that represent concrete events or design solutions. (K-2 ETS1-2, 2-ESS2-2) ● **Constructing Explanations and Designing Solutions** ○ Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions (2-ESS2-1, 2-ESS1-1) ● **Obtaining, Evaluating, and Communicating Information** ○ Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. (2-ESS2-3)
Disciplinary	● **ESS2.A: Earth Materials and Systems**

Core Ideas (DCI)	○ Wind and water can change the shape of the land. (2-ESS2-1) ● **ESS2.B: Plate Tectonics and LargeScale System Interactions** ○ Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) ● **ESS2.C: The Roles of Water in Earth's Surface Processes** ○ Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3) ● **ESS1.C: The History of Planet Earth** ○ Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1) ● **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. (2-ESS2-1) ● **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) ○ Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2- ETS1-1) ○ 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, such as climate change, 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 (CCC)	● **Structure and Function** ○ The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)

	● **Patterns** ○ Patterns in the natural world can be observed. (2-ESS2-2, 2-ESS2-3) ● **Stability and Change** ○ Things may change slowly or rapidly. (2-ESS2-1, 2-ESS1-1) ● **Influence of Engineering, Technology, and Science on Society and the Natural World** ○ Developing and using technology has impacts on the natural world. (2-ESS2-1) ● **Science Addresses Questions About the Natural and Material World** ○ Scientists study the natural and material world. (2-ESS2-1)
Units 5 & 6: Solids & Liquids **Timeline:** *January - February*	
Unit Overview	**Unit 5:** In this Unit, students engage with physical sciences core ideas dealing with matter and its interactions and engineering design. Students build on the science concepts of matter and its interactions developed in kindergarten using new tools to enrich observations. Students observe, describe, and compare properties of solids and liquids. They conduct investigations to find out what happens when solids and water are mixed and when liquids and water are mixed. **Unit 6:** In this Unit, students engage with physical sciences core ideas dealing with matter and its interactions and engineering design. Students build on the science concepts of matter and its interactions developed in kindergarten using new tools to enrich observations. Students observe, describe, and compare properties of solids and liquids. They conduct investigations to find out what happens when solids and water are mixed and when liquids and water are mixed.
Essential Questions	● How are solid and liquid materials similar and different? ● How do the properties of solid and liquid materials relate to how they can be used and how they can change?
Science Standards	● **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. ● **K-2 ETS1-1:** Ask questions, make observations, and gather information about a situation people want to change (e.g., climate 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 & Engineering Practices (SEP)	● **Planning and Carrying Out Investigations** ○ Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. (2-PS1-1) ● **Analyzing and Interpreting Data** ○ Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. (K-2 ETS1-3, 2-PS1-2) ● **Constructing Explanations and Designing Solutions** ○ Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. (2-PS1-3) ● **Engaging in Argument from Evidence** ○ Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s). (2-PS1-4) ● **Asking Questions and Defining Problems** ○ Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. (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, storyboard) that represent concrete events or design solutions. (K-2 ETS 1-2)
Disciplinary Core Ideas (DCI)	● **PS1.A: Structure and Properties of Matter** ○ Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) ○ Different properties are suited to different purposes. (2-PS1-2, 2- PS1-3) ○ A great variety of objects can be built up from a small set of pieces. (2-PS1-3) ● **PS1.B: Chemical Reactions** ○ Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4) ● **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) ○ Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2- ETS1-1) ○ 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, such as climate change, 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 (CCC)	● **Patterns** ○ Patterns in the natural and human designed world can be observed. (2-PS1-1) ● **Cause and Effect** ○ Events have causes that generate observable patterns. (2-PS1-4) ○ Simple tests can be designed to gather evidence to support or refute student ideas about causes.

	(2-PS1-2) ● **Energy and Matter** ○ Objects may break into smaller pieces and be put together into larger pieces or change shapes. (2-PS1-3) ● **Influence of Engineering, Technology, and Science on Society and the Natural World** ○ Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (2-PS1-2) ● **Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena** ○ Scientists search for cause and effect relationships to explain natural events. (2-PS1-4) ● **Structure and Function** ○ The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)
Units 7 & 8: Insects & Plants **Timeline:** *February - March*	
Unit Overview	**Unit 7:** In this Unit, students conclude their study of animal biodiversity by nurturing and studying another insect—the painted lady butterfly. The class observes painted lady larvae grow, pupate, and emerge as adult butterflies. Students observe the stages of complete metamorphosis and compare the natural history of moths and butterflies. Students study pollination through a video and outdoor flowering plant observations, and construct, test, and share models of pollinators. Through video and first hand investigations in the schoolyard, students explore the phenomena of pollination and the important role insects play in the life cycle of flowering plants. Students construct, test, and share models of pollinators. **Unit 8:** In this Unit, students conclude their study of animal biodiversity by nurturing and studying another insect—the painted lady butterfly. The class observes painted lady larvae grow, pupate, and emerge as adult butterflies. Students observe the stages of complete metamorphosis and compare the natural history of moths and butterflies. Students study pollination through a video and outdoor flowering plant observations, and construct, test, and share models of pollinators. Through video and first hand investigations in the schoolyard, students explore the phenomena of pollination and the important role insects play in the life cycle of flowering plants. Students construct, test, and share models of pollinators.

Essential Questions	● What is the natural history of some plants and animals in different habitats?
Science Standards	● **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 ● **2-LS4-1** Make observations of plants and animals to compare the diversity of life in different habitats ● **K-2 ETS1-1:** Ask questions, make observations, and gather information about a situation people want to change (e.g., climate 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 & Engineering Practices (SEP)	● **Planning and Carrying Out Investigations** ○ Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions (2-LS2-1, 2-LS4-1) ● **Analyzing and Interpreting Data** ○ Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. (K-2 ETS1-3) ● **Asking Questions and Defining Problems** ○ Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. (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, storyboard) that represent concrete events or design solutions. (K-2 ETS 1-2, 2-LS2-2)
Disciplinary	● **LS4.D: Biodiversity and Humans**

Core Ideas (DCI)	○ There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) ● **LS2.A: Interdependent Relationships in Ecosystems** ○ Plants depend on water and light to grow. (2-LS2-1) ○ Plants depend on animals for pollination or to move their seeds around. (2-LS2-2) ● **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. (2-LS2-2) ● **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) ○ Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2- ETS1-1) ○ 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, such as climate change, 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) ● **Scientific Knowledge is Based on Empirical Evidence** ○ Scientists look for patterns and order when making observations about the world. (2-LS4-1)
Crosscutting Concepts (CCC)	● **Cause & Effect** ○ Events have causes that generate observable patterns. (2-LS2-1) ● **Structure and Function** ○ The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2, 2-LS2-2)

3rd Grade Science

COURSE DESCRIPTION

Based on the Next Generation Science Standards and the New Jersey Learning Standards for Science, science at Empowerment Academy is designed to build on the foundation of the sciences (Earth, Life, and Physical) that students have learned beginning in Kindergarten. Using the FOSS curriculum as a foundation, students engage in hands-on, real life applications of science concepts. By the end of Grade 3, students will explore weather in diverse climates, motion and matter, and diversity of plants and animals that we can observe in the world around us.

OVERVIEW BY UNIT

Units 4 & 5: Water and Climate **Timeline:** *November - December*	
Unit Overview	**Unit 4: Weather & Water:** In this Unit, students compare local weather data that they observe and collect to meteorologists' forecasts and historical weather data. Students explore the phenomena of evaporation and condensation, which account for the transformations of water between liquid to gas. Students find out how these transformations are the key drivers of the water cycle, the mechanism that redistributes water over the whole planet. **Unit 5: Climate & Natural Disasters:** In this Unit, students analyze weather data, the everyday observable phenomena in the local atmosphere— temperature, wind, and precipitation—and think about the long-term patterns of weather in a place or region, the phenomenon known as climate. They work in groups to organize and analyze local daily weather data for 4 months of the previous year (January, April, July, and October). This leads students to think about the difference between weather (condition of the atmosphere now) and climate (typical weather that can be expected to occur in a region). Through media, students are introduced to ways that people manage the problems associated with floods. They discuss engineering methods to mitigate these weather-related hazards.
Essential	• How is water involved in weather?

Questions	• Are weather conditions the same around the world and through the year?
Science Standards	• **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 • **3-ESS3-1** Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard. • **3-5 ETS-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** 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.

Science & Engineering Practices (SEP)	• **Analyzing and Interpreting Data**
	  ○ Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations.
	• **Obtaining, Evaluating, and Communicating Information**
	  ○ Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.
	• **Engaging in Argument from Evidence**
	  ○ Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). (3-ESS3-1)
	• **Asking Questions and Defining Problems**
	  ○ Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships. (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. (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 (3-5 ETS1-2)
Disciplinary Core Ideas (DCI)	● **ESS2.D: Weather and Climate** ○ Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3- ESS2-1) ○ Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3- ESS2-2) ● **ESS3.B: Natural Hazards** ○ A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) ● **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, such as climate change, 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 (CCC)	● **Patterns** ○ Patterns of change can be used to make predictions. (3-ESS2-1,3- ESS2-2) ● **Cause and Effect** ○ Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3- 1) ● **Science is a Human Endeavor** ○ Science affects everyday life. (3- ESS3-1) ● **Influence of Engineering, Technology, and Science 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, 3-ESS3-1)
Units 6-8 : Motion & Matter **Timeline:** *December - January*	
Unit Overview	**Unit 6: Measurement & Mixtures:** Students build on their second-grade experiences with matter by using tools to collect data that demonstrate the conservation of mass. They measure the mass of materials before and after mixing. In one experiment, salt dissolves to form a solution, and students confirm that the mass of this solution matches the combined mass of the water and salt. In another experiment, they mix vinegar and baking soda, observing a bubbling reaction. Here, students note that the mass of the resulting mixture is less than that of the original materials, leading them to infer that the carbon dioxide gas released has mass. The module concludes with students designing and conducting a metric field day to creatively apply their understanding of measurement standards. **Unit 7: Force & Engineering:** "Students explore phenomena that can affect the motion of masses—the forces of magnetism and gravity. Through their investigations, students find that both magnetism and gravity can pull, and magnetism can sometimes push as well. Both forces can make things move even when not in direct contact with another object. Students refine their investigations and their abilities to use science practices and collect data regarding their observations of the interaction between paper clips and magnets. They use those data to predict how far the magnetic field extends. Building on their experience with magnetic force, students explore other pushes and pulls, considering strength and direction. Students are introduced to the effects of

	balanced and unbalanced forces. Students tackle an engineering design challenge in incremental steps. They first design a cart that can roll "from here to there," and then improve their designs to meet a specific distance challenge. Students continue with an investigation involving the phenomenon of gravity and explore how start position on a ramp affects the distance the cart travels. The final challenge incorporates students' knowledge of magnetism into their cart design to meet new challenges. This investigation develops understanding of engineering design concepts and provides opportunities for students to engage in engineering practices." **Unit 8: Pattern of Motion: "**Students use variety of systems as phenomena to explore patterns of motion. They design wheeland-axle systems and roll the systems down ramps to observe the pattern of motion. They extend their rolling investigations to systems with big and little wheels and use the predictable curved rolling path to meet challenges. Students make twirly birds (flying spinners) and explore the variables involved in the interaction between twirlying systems, gravity, and air. Students design tops and explore the variables that results in the best spinning top."
Essential Questions	● How can we use tools to measure the mass of materials in a mixture? ● How can we use observed patterns of motion to design solutions to engineering problems? ● How can some objects push and pull one another without touching? ● How can we use our observations of systems to predict motion?
Science Standards	● **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. ● **3-5 ETS-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** 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.
Science & Engineering Practices (SEP)	● **Asking Questions and Defining Problems** ○ Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships. (3-5 ETS1-1, 3-PS2-3, 3-PS2-4) ● **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. (3-5 ETS1-3, 3-PS2-1, 3-PS2-2) ● **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 (3-5 ETS1-2)
Disciplinary Core Ideas (DCI)	● **PS2.A: Forces and Motion** ○ Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces, are used at this level.) (3-PS2-1) ○ The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2) ● **PS2.B: Types of Interactions** ○ Objects in contact exert forces on each other. (3-PS2-1) ○ Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their

	distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3, 3-PS2-4) ● **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, such as climate change, 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 (CCC)	● **Patterns** ○ Patterns of change can be used to make predictions. (3-PS2-2) ● **Cause and Effect** ○ Cause and effect relationships are routinely identified. (3-PS2-1) ○ Cause and effect relationships are routinely identified, tested, and used to explain change. (3-PS2-3) ● **Influence of Engineering, Technology, and Science 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) ● **Interdependence of Science, Engineering, and Technology**

	○ Scientific discoveries about the natural world can often lead to new and improved technologies, which are developed through the engineering design process. (3- PS2-4) ● **Science Knowledge is Based on Empirical Evidence** ○ Science findings are based on recognizing patterns. (3-PS2-2) ● **Scientific Investigations Use a Variety of Methods** ○ Science investigations use a variety of methods, tools, and techniques. (3-PS2-1)
Units 9 &10: Structures of Life **Timeline:** *February - March*	
Unit Overview	**Unit 9: Human Body:** "Students observe the articulated human skeletal system in action, use posters and a sense of touch to estimate and refine a count of the 206 human bones, and build skeleton puzzles from memory. Students dissect rodent bones from owl pellets and compare them to human bones. They explore joints and their role in movement focusing on opposable thumbs. Students build operational models of muscle-bone systems to see how muscles move bones. They investigate their skin by making and analyzing fingerprint patterns." **Unit 10: Adaptations and Behaviors:** "Students observe and record some of the structures of a crustacean, the crayfish, and compare it to other organisms. They establish a feeding and maintenance schedule for the organisms. Students investigate crayfish behavior and map where the crayfish spend time within their habitat. Through readings, organism cards, and a video, students learn about adaptations of organisms in different environments, including different kinds of group and social behaviors. Students use a computer simulation to study variation of traits in species and explore how variation might affect survival of individuals. Students engage in an outdoor simulation activity to explore food chains."
Essential Questions	● How are characteristics similar to and different from parents to offspring? ● What can we learn about animals that lived in the past by looking at their skeletons? ● What are characteristics that allow populations of animals to survive and reproduce in an environment?
Science Standards	● **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. ● **3-LS2-2** Construct an argument that some animals form groups that help members survive.

	• **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 • **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. • **L-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.
Science & Engineering Practices (SEP)	• **Developing and Using Models** ○ Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions (3-LS1-1) • **Engaging in Argument from Evidence** ○ Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). (3-LS4-3, 3-LS4-4) • **Analyzing and Interpreting Data** ○ Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. (3-LS3-1, 3-LS4-1) • **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. (3-LS3-2,3-LS4-2)
Disciplinary Core Ideas (DCI)	• **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ○ When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to

	new locations, yet others move into the transformed environment, and some die. (3-LS4-4) ● **LS1.B: Growth and Development of Organisms** ○ Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1) ● **LS2.D: Social Interactions and Group Behavior** ○ Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (3-LS2-1) ● **LS3.A: Inheritance of Traits** ○ Many characteristics of organisms are inherited from their parents. (3- LS3-1) ○ Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3- LS3-2) ● **LS3.B: Variation of Traits** ○ Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1) ○ The environment also affects the traits that an organism develops. (3-LS3-2) ● **LS4.A: Evidence of Common Ancestry and Diversity** ○ Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (3-LS4-1) ○ Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1) ● **LS4.B: Natural Selection** ○ Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2) ● **LS4.C: Adaptation** ○ For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4- 3) ● **LS4.D: Biodiversity and Humans** ○ Populations live in a variety of habitats and change in those habitats affects the organisms living there. (3-LS4-4)
Crosscutting Concepts	● **Patterns** ○ Patterns of change can be used to make predictions. (3-LS1-1)

(CCC)	● **Scientific Knowledge is Based on Empirical Evidence** ○ Science findings are based on recognizing patterns. (3-LS1-1) ● **Cause and Effect** ○ Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1, 3-LS4-2, 3-LS4-3) ● **Scale, Proportion, and Quantity** ○ Observable phenomena exist from very short to very long time periods. (3-LS4-1) ● **Systems and System Models** ○ A system can be described in terms of its components and their interactions. (3-LS4-4) ● **Interdependence of Science, Engineering, and Technology** ○ Knowledge of relevant scientific concepts and research findings is important in engineering. (3-LS4- 4) ● **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** ○ Science assumes consistent patterns in natural systems. (3- LS4-1)

4th Grade Science

COURSE DESCRIPTION

Based on the Next Generation Science Standards and the New Jersey Learning Standards for Science, science at Empowerment Academy is designed to build on the foundation of the sciences (Earth, Life, and Physical) that students have learned beginning in Kindergarten. Using the FOSS curriculum as a foundation, students engage in hands-on, real life applications of science concepts. By the end of Grade 4, students will have learned about Earth's landscape - the shape and composition of landforms, Energy - motion, electric current, sound, light, and heat, and animals and plants interactions with their environments and with each other.

OVERVIEW BY UNIT

Units 4 & 5: Soil, Rocks & Weathering & Mapping Earth's Surface **Timeline:** *November - December*	
Unit Overview	**Unit 4: Soil, Rocks & Weathering:** Geology is the study of our planet's earth materials and natural resources. Because they are so ubiquitous and abundant, they are taken for granted. This unit will provide students with firsthand experiences with solid and rocks and modeling experience using tools such as topographic maps and stream tables to engage with Earth's surface. Students conduct controlled experiments by incrementally changing specific environmental conditions to determine the impact of changing the variables of slope and amount of water in stream tables. Students interpret data from diagrams and visual representations to build explanations from evidence and make predictions of future events. **Unit 5: Mapping Earth's Surface:** Students explore the phenomena of Earth's mountains by delving into topography through the construction of a mountain landform model. Using a foam model of Mount Shasta, they create a topographic map, which they then utilize to generate a profile of the mountain. They also study volcanoes and employ topographer's tools to examine the effects of the Mount St. Helens eruption. Additionally, students learn about rapid Earth surface changes caused by landslides, earthquakes, floods, and volcanoes, and brainstorm potential strategies that engineers and scientists could implement to mitigate the impacts of these geological events.

Essential Questions	• What are Earth's land surfaces made of? • Why are landforms not the same everywhere?
Science Standards	• **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 • **4-ESS2-1** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation • **4-ESS2-2** Analyze and interpret data from maps to describe patterns of Earth's features. • **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** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment • **3-5 ETS-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** 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.

Science & Engineering Practices (SEP)	• **Asking Questions and Defining Problems**
	  ○ Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships. (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. (3-5 ETS1-3, 4-ESS2-1)
	• **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 (3-5 ETS1-2, 4-ESS1-1, 4-ESS3-2)

updated 2024-2025
subject to change

	● **Analyzing and Interpreting Data** ○ Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used (4-ESS2-2) ● **Obtaining, Evaluating, and Communicating Information** ○ Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluate the merit and accuracy of ideas and methods. (4-ESS3-1)
Disciplinary Core Ideas (DCI)	● **ESS1.C: The History of Planet Earth** ○ Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1) ● **ESS2.A: Earth Materials and Systems** ○ Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2- 1) ● **ESS2.B: Plate Tectonics and LargeScale System Interactions** ○ The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2) ● **ESS2.E: Biogeology** ○ Living things affect the physical characteristics of their regions. (4- ESS2-1) ● **ESS3.A: Natural Resources** ○ Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3- 1) ● **ESS3.B: Natural Hazards** ○ A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4- ESS3-2)

	● **ETS1.B: Designing Solutions to Engineering Problems** ○ Testing a solution involves investigating how well it performs under a range of likely conditions. (4-ESS3-2) ● **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, such as climate change, 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 (CCC)	● **Patterns** ○ Patterns can be used as evidence to support an explanation. (4-ESS1-1, 4-ESS2-2) ● **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** ○ Science assumes consistent patterns in natural systems. (4- ESS1-1) ● **Cause and Effect** ○ Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2- 1, 4-ESS3-1, 4-ESS3-2) ● **Influence of Engineering, Technology, and Science 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, 4-ESS3-1) ● **Influence of Science, Engineering and Technology on Society and the Natural World** ○ Over time, people's needs and wants change, as do their demands for new and improved technologies. (4-ESS3-1) ○ Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2)
Units 6 & 7: Energy **Timeline:** *December - January*	
Unit Overview	**Unit 6: Electricity & Magnetism:** Students explore the phenomenon of electric current in circuits, which are the pathways for electricity flow. They work with various components—such as D-cells, lightbulbs, motors, switches, and wires—to investigate conductors and insulators. They examine both series and parallel circuits, comparing how components function in each type. Based on their observations of how electricity transfers energy to create light and motion, they make and justify predictions. In addition, students investigate magnets and their interactions with various materials and with each other. They venture outdoors to find objects that magnets attract and conduct experiments to determine whether like or opposite poles attract. They also construct a simple compass to detect magnetic effects and learn that magnetism can be induced in iron. By graphing data on the force of attraction between two magnets, they identify patterns in their interactions. **Unit 7: Transfers of Energy:** Students observe the phenomenon of energy transfer, which manifests as heat, light, sound, and motion. They are introduced to various energy sources and components that store energy, such as potential energy linked to position or condition. Through structured investigations with steel balls and ramps, students explore how the starting position on the ramp influences the speed of the rolling ball. By conducting controlled experiments that focus on converting potential energy into kinetic energy, they test the effects of variables like mass and release position on energy transfer.
Essential	● How does energy transfer between systems?

Questions	
Science Standards	● **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. ● **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. ● **3-5 ETS-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** 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.
Science & Engineering Practices (SEP)	● **Asking Questions and Defining Problems** ○ Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships. (3-5 ETS1-1, 4-PS3-3) ● **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. (3-5 ETS1-3, 4-PS3-2) ● **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 (3-5 ETS1-2, 4-PS3-1, 4-PS3-4, 4-PS4-3) ● **Developing and Using Models** ○ Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. (4-PS4-1, 4-PS4-2)
Disciplinary Core Ideas (DCI)	● **PS3.A: Definitions of Energy** ○ The faster a given object is moving, the more energy it possesses. (4-PS3-1) ○ Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2, 4-PS3-3) ○ PS3.B: Conservation of Energy and Energy Transfer Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2, 4- PS3-3) ○ Light also transfers energy from place to place. (4-PS3-2) ○ Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4- PS3-2, 4-PS3-4) ● **PS3.C: Relationship Between Energy and Forces** ○ When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3) ● **PS3.D: Energy in Chemical Processes and Everyday Life** ○ The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) ● **PS4.A: Wave Properties** ○ Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (4-PS4-1) ○ Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)

	● **PS4.B: Electromagnetic Radiation** ○ An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2) ● **PS4.C: Information Technologies and Instrumentation** ○ Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3) ● **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, 4-PS3-4) ● **ETS1.B: Developing Possible Solutions** ○ Research on a problem, such as climate change, 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, 4-PS4-3)
Crosscutting Concepts (CCC)	● **Energy and Matter** ○ Energy can be transferred in various ways and between objects. (4-PS3-1, 4-PS3-2, 4-PS3-3, 4-PS3-4) ● **Influence of Engineering, Technology, and Science 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, 4-PS3-4) ● **Science is a Human Endeavor**

	○ Most scientists and engineers work in teams. (4-PS3-4) ○ Science affects everyday life. (4- PS3-4) ● **Patterns** ○ Similarities and differences in patterns can be used to sort and classify natural phenomena. (4-PS4-1) ○ Similarities and differences in patterns can be used to sort and classify designed products. (4-PS4-3) ● **Cause & Effect** ○ Cause and effect relationships are routinely identified. (4-PS4-2) ● **Interdependence of Science, Engineering, and Technology** ○ Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4- 3) ● **Scientific Knowledge is Based on Empirical Evidence** ○ Science findings are based on recognizing patterns. (4-PS4-1)
Units 8 & 9: Environments **Timeline:** *February*	
Unit Overview	**Unit 8: Ecosystems & Environmental Factors:** Students observe terrestrial organisms, including mealworms and isopods in the classroom and leaf-litter critters in the schoolyard. They set up a mealworm environment at two temperatures to track the life cycle and investigate how isopods respond to factors like water and light while designing their own environment. They explore small animals in leaf litter, studying their structures, and describe both living (biotic) and nonliving (abiotic) components of terrestrial environments, learning about diverse ecosystems such as deserts and rainforests. By organizing information from investigations, readings, and videos, students understand how structures function to meet the needs of organisms. Additionally, students compare the structures and functions of land and water organisms, particularly focusing on how different animals obtain oxygen. They explore how animals use their sensory systems to gather information from their environment and guide their actions, modeling the role of hearing through simulations and research.

	Unit 9: Ranges of Tolerance: In this unit. students revisit the desert and rainforest environments explored in Investigation 1 to examine how different plants thrive in each setting. They conduct controlled experiments to determine the water tolerance range for germination of four seed types: corn, pea, barley, and radish. In a second experiment, they assess the effect of salinity on these seeds. Additionally, students study local plants by mapping those in the schoolyard, relating their distribution to environmental factors. They also investigate plant adaptations that enable organisms to flourish in both dry desert and wet tropical environments.
Essential Questions	● How do the structures of terrestrial organisms function to support the survival of the organisms in that environment?
Science Standards	● **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-LS1-2** 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
Science & Engineering Practices (SEP)	● **Developing and Using Models** ○ Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions (4-LS1-2) ● **Engaging in Argument from Evidence** ○ Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). (4-LS1-1)
Disciplinary Core Ideas (DCI)	● **LS1.A: Structure and Function** ○ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) ● **LS1.D: Information Processing** ○ Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

Crosscutting Concepts (CCC)	● **Systems and System Models** ○ A system can be described in terms of its components and their interactions. (4-LS1-1, 4-LS1-2)
Units 10 & 11: Living Systems **Timeline:** *February - March*	
Unit Overview	**Unit 10 & 11: Plant Vascular Systems & Circulatory & Respiratory Systems:** In this unit, students discover that all cells have essential requirements: water, food, gas exchange, and waste removal. They examine the transport systems that multicellular organisms use to move nutrients and waste. This includes exploring leaf transpiration, modeling the human heart, and investigating lung capacity to understand the interconnected components of the vascular system in plants and the circulatory and respiratory systems in humans.
Essential Questions	● How do plants and animals get nutrients to all of their cells? ● How are nutrients transported to cells in a plant? ● How do humans transport nutrients to all their cells? ● Why do people breathe?
Science Standards	● **4-LS1-2** 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
Science & Engineering Practices (SEP)	● **Developing and Using Models** ○ Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions (4-LS1-2) ● **Engaging in Argument from Evidence** ○ Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). (4-LS1-1)
Disciplinary Core Ideas (DCI)	● **LS1.A: Structure and Function** ○ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

	● **LS1.D: Information Processing** ○ Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)
Crosscutting Concepts (CCC)	● **Systems and System Models** ○ A system can be described in terms of its components and their interactions. (4-LS1-1, 4-LS1-2)