Early Elementary STEM

Overview:

Early Elementary STEM for Pre-Kindergarten through 2nd grade is an enhancement class that is the building blocks for understanding the relationship among science, technology, engineering, and math. This class provides discovery and innovation, using hands-on and interactive activities to understand how things work, while introducing both the scientific method and the engineering design process.

Course Rationale:

STEM education in early elementary grades allows students to have the chance to investigate and explore the world around them. Young students are also given opportunities to build their confidence to ask questions about the world, not only the "why" questions, but more importantly the "what" questions. Early Elementary STEM initiates the groundwork for curiosity among all elementary aged students.

Grades: Pre Kindergarten - 2nd Grade

Unit Title	Length of Unit
Unit 1: PreK - 2nd Grade What is STEM?	4 - 8 weeks
Unit 2: PreK/K Science Curriculum Enhancement	8 - 12 weeks
Unit 2: 1st Grade Science Curriculum Enhancement	8 - 12 weeks
Unit 2: 2nd Grade Science Curriculum Enhancement	8 - 12 weeks
Unit 3: Engineering Curriculum Enhancement	8 - 12 weeks

Elementary STEM Curriculum

Course Title: PreK-2nd Grade **Unit Title: What is STEM?** **Length of Unit 4-8 weeks**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Activities/Projects	Resources	Evidence of Understanding
K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. K-2 ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. K-2 ETS1-3. Analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	Most students have no prior exposure or understanding of STEM components before entering kindergarten. This unit introduces the basic concepts of STEM, (Science, Technology, Engineering, and Math). **I CAN Statements:** I can have basic understanding of what the life of a scientist is like. I can have basic understanding of what an engineer does. I can have basic understanding of what part technology plays in STEM. I can have basic understanding of what a mathematician does.	Scientist Technology Engineer Mathematician Question Observe Hypothesis Experiment Record Measure Data Analyze Conclude Work together Explore Investigate Problem solve Communicate Design Solution Evaluate Making sense Model	Kids will learn: This unit will provide the building blocks for understanding the relationship among science, engineering, technology, and teamwork, which is necessary for discovery and innovation. **SCIENCE:** The Scientific Method process is a way to for scientists to study and learn things. (It doesn't matter what the scientist is trying to learn, using the scientific method can help	Books: Engineering the ABC's: How Engineers Shape Our World Designing Dandelions: An Engineering Everything Adventure Rosie Revere, Engineer Iggy Peck, Architect Ada Twist, Scientist What Do You Do With an	What will be the evidence of learning? Formative Assessment Facilitation and questioning techniques, sharing of observations and reasoning through results, drawings and approximations of writing and labeling of investigations Summative Assessment Performance assessment: Communicate and demonstrate findings from investigation and solution to problem.

	I can learn to use the scientific process in solving a simple scientific problem. I can learn to use the engineering design process when given a simple problem to solve. I can work in a cooperative group. **Essential Questions:** How do I investigate materials and objects around me? What are scientists? How do scientists solve problems? What are engineers? How do engineers solve problems? What are mathematicians? How do mathematicians solve problems? What are technologists? How do computer technologists solve problems?	Computer Internet iPad Apps Keyboard Cell phone Camera Radio Tools	them come up with an answer.) **TECHNOLOGY:** Technology and interactive media are effective tools to support learning and development in all subject areas. **ENGINEERING:** The Engineering Design Process is a tool they can use to help solve problems. Also, students will be able to use a physical model to investigate and describe how engineers work. **MATH:** In Math, tackling problems begin with defining the problem, then thinking of ways to solve it, implementing a solution, and	Idea? What Do You Do With a Problem? Rocks, Jeans, and Busy Machines: An Engineering Kids Storybook Girls Think of Everything: Stories of Ingenious Inventions by Women Girls Who Looked Under Rocks: The Lives of Six Pioneering Naturalists Sorting Through Spring Websites:	

			evaluating the results. (Performing math problems help students practice the problem-solving steps that apply to everyday situations.)	http://kids.nationalgeographic.com http://www.discoveryeducation.com http://askdruniverse.wsu.edu/ http://pbskids.org/designsquad http://www.egfi-k12.org http://www.exploratorium.edu http://www.extremescience.com http://science.howstuffworks.com http://www.m	

				sichicago.org https://www.tynker.com http://www.nasa.gov/audience/forstudents/index.html http://www.nasa.gov/education/semaa http://www.pbs.org/wgbh/nova http://www.sciencebuddies.org http://www.sciencechannel.com http://stem-works.com https://www.techrocket.com	

Elementary STEM Curriculum

Course Title: Pre K/K **Unit Title: Science Curriculum Enhancement** **Length of Unit 8-12 weeks**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Kindergarten:Vocabulary	Activities/Projects	Resources	Evidence of Understanding
Pre K/Kindergarten: 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	The science learning targets for Kindergarten are the following topics: • Motion and Stability - Forces and interactions • Energy - Sunlight • Molecules to Organisms - Structures and Processes	Scientist Question Observe Hypothesis Collect samples Experiment Record Measure Data Analyze	Kids will learn: This unit will provide enrichment for the understanding of scientific topics designated for kindergarten following the NGSS standards. Among	Books: Variety of science picture books/non-fiction books Websites: http://kids.nation	What will be the evidence of learning? Formative Assessment Facilitation and questioning techniques, sharing of observations and

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-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.	• Earth's Systems- Plants and Animals • Earth and Human Activity - Impact on Humans **I CAN Statements:** I can have basic understanding of what the life of a scientist is like. I can observe how objects fall toward the Earth. I can identify what a force is. I can demonstrate what a force is. I can observe how sunlight affects the Earth's surface. I can use tools and materials to design and build a structure that will reduce the warming effect of sunlight. I can describe patterns of what plants need to survive. I can describe patterns of	Conclude Work together Explore Investigate Problem solve Communicate Design Solution Evaluate Making sense Model Computer Internet iPad Apps Tools: Goggles Lab Equipment Magnifying Glass Microscope Magnets	the topics are: Motion and Stability, Energy, Molecules to Organisms, Earth's Systems and the impact of human activity. Students will be encouraged to be curious about the world around them. In the scientific lessons, students will try and answer questions through exploration. They will discover through observations and will begin to collaborate with their peers in small and large groups. Students will begin to use laboratory tools during their observations and use scientific vocabulary.	algeographic.com http://www.discoveryeducation.com http://askdruniverse.wsu.edu/ http://pbskids.org/designsquad http://www.egfi-k12.org http://www.exploratorium.edu http://www.extremescience.com http://science.howstuffworks.com http://www.msichicago.org https://www.tynker.com http://www.nasa.gov/audience/forst	reasoning through results of drawings and conversation.

	what animals need to survive. I can explain how plants survive in different environments. I can explain how animals survive in different environments. **Essential Questions:** What are scientists? How do scientists solve problems? How do I investigate materials and objects around me? What happens if you push or pull an object harder? What is the effect of sunlight on Earth's natural surfaces of sand, soil, rock, and water? How does different materials on Earth warm by sunlight in different amounts? What is the effect of		The Scientific Method process will be reviewed and explained for scientists to study and learn things.	udents/index.html http://www.nasa.gov/education/semaa http://www.pbs.org/wgbh/nova http://www.sciencebuddies.org http://www.sciencechannel.com http://stem-works.com https://www.techrocket.com	

	sunlight on surfaces if I make a prototype structure that shades light using tools and materials. Where do animals live and why do they live there? What is the effect of sunlight on different natural surfaces? How can I design a structure to block the sunlight with the tools and materials provided?				

Elementary STEM Curriculum

Course Title: 1st Grade **Unit Title: Science Curriculum Enhancement** **Length of Unit 8-12 weeks**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Kindergarten:Vocabulary	Activities/Projects	Resources	Evidence of Understanding

1st Grade: 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. 1-PS4-3. 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. 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-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted.	The science learning targets for 1st Grade are the following topics: • Waves: Light and Sound • Structure, Function, and Information Processing of Plants and Animals • Space Systems: Patterns and Cycles **I CAN Statements:** I can have basic understanding of what the life of a scientist is like. I can understand that science investigations begin with a question. I can understand that light and sound are both examples of energy. I can understand that sound travels in waves. I can understand how sound makes objects vibrate.	Scientist Question Observe Hypothesis Collect samples Experiment Record Measure Data Analyze Conclude Work together Explore Investigate Problem solve Communicate Design Solution Evaluate Making sense Model Computer Internet iPad Apps Tools:	Kids will learn: This unit will explore a number of "henrichment for the understanding of scientific topics designated for 1stgrade following the NGSS standards. Among the topics are: Light and Sound Energy, Plant and Animal Structure and how the are the same and different, Space System patterns. In the scientific lessons, students will continue their learning and answer questions through exploration. They will discover through observations and	Books: All About Light All About Sound Explore a number of "how-to" books Sending Messages With Light and Sound What are Shadows and Reflections Websites: http://kids.nationalgeographic.com http://www.discoveryeducation.com	What will be the evidence of learning? Formative Assessment Facilitation and questioning techniques, sharing of observations and reasoning through results of drawings and conversation. Summative Assessment Performance assessment: Communicate and demonstrate findings from investigation and solution to problem.

	I can understand how light can be considered opaque, translucent, or transparent. I can identify what a force is. I can demonstrate what a force is. I can observe how sunlight affects the Earth's surface. I can describe patterns of what plants need to survive. I can describe patterns of what animals need to survive. I can explain how plants survive in different environments. I can explain how animals survive in different environments. I can understand how the Sun is the center of our planetary system and all planets orbit around it.	Goggles Lab Equipment Magnifying Glass Microscope Shadow Illuminate Transparent Translucent OpaqueS Sun Moon Stars Planets Orbit Sunrise Sunset	will continue to collaborate with their peers in small and large groups. Students will begin to use laboratory tools during their observations and use scientific vocabulary. The Scientific Method process will be reviewed and explained for scientists to study and learn things.	http://askdruniverse.wsu.edu/ http://pbskids.org/designsquad http://www.egfi-k12.org http://www.exploratorium.edu http://www.extremescience.com http://science.howstuffworks.com http://www.msichicago.org https://www.tynker.com http://www.na	

	I can understand the patterns of the Sun and how it affects our day and night. **Essential Questions:** What are scientists? How do scientists solve problems? What happens when materials vibrate? How does light travel? How does sound travel? Does sound travel better through air, water, or solids? What are some ways plants and animals meet their needs so that they can survive and grow? What objects are in the sky and how do they seem to move?			sa.gov/audience/forstudents/index.html http://www.nasa.gov/education/semaa http://www.pbs.org/wgbh/nova http://www.sciencebuddies.org http://www.sciencechannel.com http://stem-works.com https://www.techrocket.com	

Elementary STEM Curriculum

Course Title: 2nd Grade **Unit Title: Science Curriculum Enhancement** **Length of Unit 8-12 weeks**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Kindergarten:Vocabulary	Activities/Projects	Resources	Evidence of Understanding
2nd Grade: 2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. 2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. 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.	The science learning targets for 2nd grade are the following topics: • Structure and Properties of Matter • Interdependent Relationships in Ecosystems • Processes that Shape the Earth **I CAN Statements:** I can have basic understanding of what the life of a scientist is like.	Scientist Question Observe Hypothesis Collect samples Experiment Record Measure Data Analyze Conclude Work together Explore Investigate Problem solve Communicate Design	Kids will learn: This unit will provide enrichment for the understanding of scientific topics designated for 2nd grade following the NGSS standards. Among the topics are: Motion and Stability, Energy, Molecules to Organisms, Earth's Systems and the impact of human activity.	Books: Amazing Materials Series: Amazing Science Changing Materials Series: Working With Materials Melting And Freezing Series: Science Readers: A Closer Look	What will be the evidence of learning? Formative Assessment Facilitation and questioning techniques, sharing of observations and reasoning through results of drawings and conversation. Summative Assessment Performance assessment: Communicate and demonstrate findings from investigation and

-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.	**Essential Questions:** How does land change and what are some things that cause it to change? What are the different kinds of land and bodies of water? How are materials similar and different from one another, and how do the properties of the materials relate to their use? What do plants need to grow? How many types of living things live in a place? How does water shape the Earth? What is the difference between erosion and displacement? What forces cause erosion? What are the different	Solution Evaluate Making sense Model Computer Internet iPad Apps Tools: Goggles Lab Equipment Magnifying Glass Microscope Different names of soils - Sandy Loam, Sand, Clay, etc. Mountains Hills Valleys Rivers Oceans Streams Lakes Plains Plateaus Islands Deserts	In the scientific lessons, students will try and answer questions through exploration. They will discover 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. The Scientific Method process will be reviewed and explained for scientists to study and learn things. They will use it to find changes heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and	Oscar And The Snail Series: Start With Science Websites: http://kids.nationalgeographic.com http://www.discoveryeducation.com http://askdruniverse.wsu.edu/ http://pbskids.org/designsquad http://www.egfi-k12.org http://www.exploratorium.edu	solution to problem.

	landforms on Earth? What is the history of the Earth? What are tectonic plates?	Peninsulas	sometimes they are not. Conduct experiments to see if plants depend on water and light to grow. Students will discover how erosion affects the soil with wind, water, and ice. Students will create landforms by molding material into the different types of forms that appear on Earth.	http://www.extremescience.com http://science.howstuffworks.com http://www.msichicago.org https://www.tynker.com http://www.nasa.gov/audience/forstudents/index.html http://www.nasa.gov/education/semaa http://www.pbs.org/wgbh/nova http://www.sciencebuddies.org http://www.sciencechannel.c	

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Elementary STEM Curriculum

Course Title: Pre K-2 **Unit Title: Engineering Curriculum Enhancement** **Length of Unit 8-12 weeks**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Kindergarten:Vocabulary	Activities/Projects	Resources	Evidence of Understanding
PreK - 2nd Grade: K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new	The science learning targets for Kindergarten are the following topics: • Modeling in K–2 builds on prior experiences and progresses to include using and developing	Scientist Question Observe Hypothesis Collect samples Experiment Record	Kids will learn: This unit will provide enrichment for the understanding of scientific and engineering topics	Books: Simple Machines (Let's-Read-and-Find-Out Science 2) Pull, Lift, and Lower: A Book	What will be the evidence of learning? Formative Assessment Facilitation and questioning

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.	models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions • Investigating and exploring gears, wheels, axles, levers, and pulleys; and matching a solution to needs. • Cooperatively working in a team • Create simple machine builds with Legos to develop an understanding of science and engineering concepts **I CAN Statements:** I can have basic understanding of what the life of a engineer is like. I can use build alone or in pairs, depending on my ability. I can use Legos and other	Measure Data Analyze Conclude Work together Explore Investigate Problem solve Communicate Design Solution Evaluate Making sense Model Computer Internet iPad Apps Tools: Legos Unconventional Materials like clay, pipe cleaners, pieces of wood, craft sticks, rubber bands, spaghetti, marshmallows, etc.	designated for pre-kindergarten through 2nd grade following the NGSS standards. Among the topics are: investigating simple machines, designing, making, and testing Legos with simple instructions in 2 dimensions to create 3 dimensional models. Students will be encouraged to work as a team coopera-tively through the Engineering Design Process. Students will begin to use laboratory tools during their observations and use scientific vocabulary. Students will begin to use engineering tools during their	About Pulleys (Amazing Science: Simple Machines) Simple Machines (Starting with Science) Variety of science picture books/non-fiction books Websites: http://kids.nationalgeographic.com http://www.discoveryeducation.com http://askdruniverse.wsu.edu/ http://pbskids.org/designsquad http://www.egfi-k12.org http://www.exploratorium.edu	techniques, sharing of observations and reasoning through results of drawings and conversation. Summative Assessments on Engineering Design Process Summative Assessments on Simple Machines

	materials to find solutions like young scientists and engineers. I can begin to use the Engineering Design Process (EDP)to connect to identifying the problem to solve. I can use the EDP to imagine a plan of action to solve the problem.. I can use the EDP to construct the build using the instructions and/or solving a problem. I can use the EDP to test my build, then modify and make changes to the construction of my build to improve it. I can investigate simple machines that are driven by wind power,. I can investigate friction and other forces that change the performance of my build.		builds and communicate using engineering terms and vocabulary.	http://www.extremescience.com http://science.howstuffworks.com http://www.msichicago.org https://www.tynker.com http://www.nasa.gov/audience/forstudents/index.html http://www.nasa.gov/education/semaa http://www.pbs.org/wgbh/nova http://www.sciencebuddies.org http://www.sciencechannel.com http://stem-works.com	

	Essential Questions: What are scientists? How do scientists solve problems? How do I investigate materials that I would use in a design? What happens if you push or pull an object harder? What is the effect of sunlight on Earth's natural surfaces of sand, soil, rock, and water? How does different materials on Earth warm by sunlight in different amounts? What is the effect of sunlight on surfaces if I make a prototype structure that shades light using tools and materials. Where do animals live and why do they live there? What is the effect of			https://www.techrocket.com	

	sunlight on different natural surfaces? How can I design a structure to block the sunlight with the tools and materials provided?				