NKU | **CINSAM:** Center for Integrative Natural Science and Mathematics

STEM2U Fall 2024
Schedule & Lesson Details

Date/Times	Activity & Description	Materials Needed for Activity	Standards Connection
September 11 9:15 - 10:15 am EST 2:00 - 3:00 pm EST	**Back to School Challenge: Name Tags** Your favorite lesson is back with updated criteria and constraints! Join us as we introduce students to the Engineering Design Process with this engaging lesson. Students create a name tag with specific criteria and constraints, including a movable part, a shape/design that represents an interest of the student, the ability to hold a pencil and so much more!	**Per student:** - blank paper - pencil - scissors - glue - tape - ruler - straws - markers, crayons, or colored pencils - brass tacks, binder clips, or paper clips - extra construction paper, cardboard, or other creative crafting supplies	**DCI:** 3-5 Engineering Design - Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution. **SEP:** Asking Questions and Defining Problems - Specifying relationships between variables and clarifying arguments and models. **CCC:** Influence of Science, Engineering, and Technology on Society and the Natural World - The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values.
September 18 9:15 - 10:15 am EST 2:00 - 3:00 pm EST	**Bird Beak Data Buffet** The perfect interdisciplinary lesson to get students intrigued about animal adaptations. Students have the opportunity to make sense of the data they collect by analyzing it in charts and graphs. This lesson is a great integration of Science and Math!	**Per group:** - large bucket/bin (to hold all of the "bird food") - timer - 40 rubber bands, various sizes - 40 paper clips, various sizes - 40 toothpicks - 40 macaroni noodles - 1 binder clip (or you could give each student a binder clip and have them each be various sizes) - 1 set of tweezers - 1 set of safety scissors - 4 plastic cups	**DCI**: 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) **SEP:** Planning and Carrying Out Investigations - Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3) **CCC:** Cause and Effect

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Revised 9-4-2024

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		Per student: - student data sheet (emailed) - 1 plastic spoon - pencil - crayons/colored pencils - ruler (optional) - calculator (optional for younger students)	- Cause and effect relationships are routinely identified and used to explain change. **3-5-ETS1-3:** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. **Math Connections** **KY.3.MD.3:** Investigate Questions Involving Categorical Data a. Identify a statistical question focused on categorical data and gather data; b. Create a scaled pictograph and a scaled bar graph to represent a data set (using technology or by hand); c. Make observations from the graph about the question posed, including "how many more" and "how many less" questions.
September 25 9:15 - 10:15 am EST 2:00 - 3:00 pm EST	**Water Wheels** For thousands of years, humans have been harnessing the power of water. In this lesson, students will learn how water is used to create electricity, and then design and test their own water wheel.	**Per student *or* group:** - 2 disposable plates (Styrofoam recommended) **or** 2-liter bottle (for the body of the water wheel) - wooden dowel or skewer - tape - string - small cup - misc. building materials (such as small disposable cups, spoons, small bowls, paper clips, index	**DCI:** PS3.A Definitions of Energy - Energy can be moved from place to place by moving objects. **SEP:** Constructing Explanations and Designing Solutions - Apply scientific ideas to solve design problems. **CCC:** Energy and Matter - Energy can be transferred in various ways and between objects.

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		cards, etc.) - objects that can be added to a cup to add weight (such as pennies or washers) For testing water wheels: - water - large waterproof container (like a sink or plastic storage bin) - pitcher or water jug (to create flowing water)	
October 2 9:15 - 10:15 am EST 2:00 - 3:00 pm EST	**Hole-in-One: Energy is as Easy as Putt-Putt** What's better than Putt-Putt? SCIENCE *and* PUTT-PUTT! Students will be challenged to design and build a putt-putt hole that allows for optimal energy transfer! Before doing this, we will explore different materials to discover which material causes a golf ball to travel the longest distance after collision and changing direction.	**Per group (for Collision Tests):** - putt-putt/golf ball - ramp - masking tape/painter's tape (to mark distances) - ruler or tape measure - collision materials: sponge, wooden block, cardboard, plastic, Styrofoam (These only need to be large enough to tape down and test the collision distance after impact. You could even do this as a demo and collect class data instead of group data). **Per group (for Putt-Putt Engineering):** - putt-putt/golf ball - meter stick (this will be used as a golf putter)	**DCI:** 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. **SEP:** Planning and Carrying Out Investigation - Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. **CCC:** Energy and Matter in Systems - Energy can be transferred in various ways and between objects. **3-5-ETS1-3**: Plan and carry out fair tests in which variables are controlled and failure points are

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		- large box lid, cardboard box, or something similar with edges to build their putt-putt hole on - at least two different materials to include on course: sponges, plastic (spoons, bowls, plates), pieces of cardboard/construction paper, craft tubes, wood blocks, Styrofoam, foam craft sheets, craft sticks etc. - tape - scissors - any other building supplies - student data sheet (emailed) - pencil	considered to identify aspects of a model or prototype that can be improved.
October 9	**No Live STEM2U**		
October 16	**No Live STEM2U**		
October 23 9:15 - 10:15 am EST 2:00 - 3:00 pm EST	**Waller Coasters** Students will engineer a descending marble maze obstacle course on the wall using everyday materials. With a focus on potential and kinetic energy, students zoom through their Waller Coaster pointing out different types of energy.	**Per group:** - pool noodles, pipe insulation, or paper towel rolls (Before the lesson, these should be cut in half down the middle, long ways to create a track.) - paper template, index cards - masking tape or painter's tape - scissors - marble or other small balls	**DCI:** PS3.A Definition of Energy - The faster a given object is moving, the more energy it possesses. **SEP:** Constructing Explanations and Designing Solutions - Use evidence (e.g., measurements, observations, patterns) to construct an explanation. - Apply scientific ideas to solve design problems. **CCC:** Energy and Matter - Energy can be transferred in various ways and

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			between objects. **3-5-ETS1-3:** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

October 30
9:15 - 10:15 am EST
2:00 - 3:00 pm EST
	Festive Flashlights
	
	Make circuits come alive this spooky season as students build their own festive flashlights. Using festive cut-outs, they can watch their flashlights come to life as shadows dance on the walls of the classroom.
		Per student *or* group:
		- jumbo popsicle stick
		- piece of aluminum foil
		- clear tape
		- small size metal binder clip
		- 3V coin cell battery (CR 2032)
		- small LED bulb (color-changing ones are fun)
		- copper tape
		- non-conductive tape (masking, electrical, scotch, duct, etc.)
		- hot glue gun and glue sticks
		- scissors
		- Reflector Sheet (printed on white cardstock)
		- festive images (printed on white cardstock)
		  ○ pumpkin
		  ○ skull
			DCI: PS3.B Conservation of Energy and Energy Transfer
			- Energy is present whenever there are moving objects, sound, light, or heat.
			- Light also transfers energy from place to place.
			- 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)
			
			SEP: Plan and Carry Out Investigation
			- Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or to test a design solution.
			
			CCC: Energy and Matter in Systems
			- Energy can be transferred in various ways and between objects.
			
			3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

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November 6	**No Live STEM2U**		
November 13 9:15 - 10:15 am EST 2:00 - 3:00 pm EST	**Inspector Detector: Magnetic Battlefield Finders** Students will build their own Magnetic Battlefield Finders after learning all about the awesome invisible force magnets have! Their partners will try to hide magnets among other items in the battlefield to test the strength and design of each Magnetic Battlefield Finder.	**Per partner group:** - manilla file folder - 2 grid sheets (emailed) - 1-2 strong, small magnets - 1-2 other small magnets - tape - 3-4 small, non-magnetic items (Examples could include: pencil erasers, mini dominoes, small marbles, rubber bands, tiny game pieces, non-magnetic metal pieces – anything small enough to fit in the grid pieces.) **Per student (for Magnet Inspector Detector Devices):** - strong magnets - tape - craft sticks - yarn or string - craft materials - cardboard - pipe cleaners - other crafting/building materials - student data sheet (emailed)	**DCI:** PS2.B Types of Interactions - 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. **SEP:** Asking Questions and Defining Problems - Define a simple problem that can be solved through the development of a new or improved object or tool. **CCC:** 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. **3-5-ETS1-3:** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
November 20	**No Live STEM2U**		
November 27	**No Live STEM2U**		

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December 4	**No Live STEM2U**		
December 11 9:15 - 10:15 am EST 2:00 - 3:00 pm EST	**STEM X Games** We are heating things up this winter with this X Games lesson. Students dive into potential and kinetic energy while they are designing a pair of skis for their competitor that allows them to travel the farthest distance.	- plain white paper - pencil - table/desk space for skier to jump off and land Per student: - 2 pipe cleaners - tape - construction paper - scissors - 4-6 washers/nuts/pennies or anything else to add weight - measuring device (ruler, meter, stick, tape measure) Materials to have available: - straws - aluminum foil - craft Stick - cardstock - foam sheets - craft tubes - any other craft supplies	**DCI:** PS3.A Definition of Energy - The faster a given object is moving, the more energy it possesses. **SEP:** Constructing Explanations and Designing Solutions - Apply scientific ideas to solve design problems. **CCC:** Energy and Matter - Energy can be transferred in various ways and between objects **3-5-ETS1-3:** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

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