IEEE PRE-UNIVERSITY EDUCATION LESSON PLANS
http://www.tryengineering.org/lesson.php

TryEngineering offers a variety of lesson plans that align with education standards to allow teachers and students to apply engineering principles in the classroom. The matrix below will allow you to select a lesson that will be age and content appropriate for your classroom.

Lesson Plan Focus	Ages
A Century of Plastics Lesson Focus: Lesson focuses on how plastics of all sorts have been engineered in to everyday products over the past century, with emphasis on materials selection and engineering.	Ages 8-18
A Question of Balance Lesson Focus: Lesson focuses on the use of weight scales and measurement by manufacturing engineers. Teams of students are posed with the challenge of developing a system to fill jars with a specific weight or count of products such as marbles or paperclips.	Ages 11-18
Adaptive Device Design Lesson Focus: Lesson focuses on the engineering of adaptive or assistive devices, such as prosthetic devices, wheelchairs, eyeglasses, grab bars, hearing aids, lifts, or braces.	Ages 8-18
Assembly Line Lesson Focus: This lesson demonstrates the power of mass production. Students work in teams to design, construct, test, and redesign an assembly line to manufacture a product as quickly and efficiently as possible to meet the quality control criteria.	Ages 8–18
Be A Scanning Probe Microscope (Nano) Lesson Focus: Lesson focuses on how engineers have developed and use special tools that can observe the landscape of materials when they are working at the nano scale. Students learn about Scanning Probe Microscopes (SPM) and then work in teams using a pencil to explore and identify the shape of objects they cannot see, just as the SPM does at the nano level. They draw what their mind "sees" on paper, compare their results with other student teams, and share observations with their class.	Ages 8-14
Biomimicry in Engineering Lesson Focus: Lesson focuses on the concept of Biomimicry and students learn how engineers have incorporated structures and methods from the living world in products and solutions for all industries. Students then work in teams to develop a structure or system based on an example in nature that would help people living on the moon. They design their structure on paper, learn about patents, and share their designs with the class.	Ages 8-18
Blast Off! Lesson Focus: Lesson focuses on aerospace engineering and how space flight has been achieved from an engineering vantage point. Students build and launch a model rocket and consider the forces on a rocket, Newton's Laws, and other principles and challenges of actual space vehicle launch. They design their structure on paper, learn about aerospace engineering, launch their rocket, and share observations with their class.	Ages 14-18
Build a Big Wheel Lesson Focus: Lesson focuses on the engineering behind big wheels (sometimes called Ferris wheels). Teams of students explore the engineering behind the "London Eye," explore the history of big wheels, and construct a working wheel model using pasta, glue, and teabags.	Ages 8-18

Build Your Own Robot Arm Lesson Focus: Develop a robot arm using common materials. Students will explore design, construction, teamwork, and materials selection and use.	Ages 8-18
Can You Canoe? Lesson Focus: Lesson focuses on how canoes, which have been hand built for centuries, have been impacted by engineered materials and manufacturing processes over the years. Student teams design and build a model canoe frame and then cover their frame with everyday materials and test their design in a basin. Student model canoes must be able to float, travel a distance of 4 feet, and support a load. Students then evaluate the effectiveness of their canoes and those of other teams, and present their findings to the class.	Ages 8-18
Cast Your Vote Lesson Focus: Lesson focuses on how technology and engineering impact society, and how poll-taking has been influenced by engineering over time. Students design and construct a voting or polling machine out of everyday items, then evaluate the effectiveness of the design.	Ages 8-12
Chair Lift Challenge Lesson Focus: Lesson focuses on unique challenges in transportation engineering, such as devising a method for skiers or hikers to get to the top of a mountain. Students work in teams to design a "chair lift" out of everyday items that can transport a ping pong ball in an open front cup from the bottom of a "valley" to the top of a "mountain" along a clothes line or wire without the ball falling out. Students design their chairlift on paper, execute their design, test it, reflect on the challenge, and share their experiences with the class.	Ages 8-18
Classroom Paper Recycling Lesson Focus: Lesson focuses on how engineers and others have developed and improved the manufacturing of recycled paper. Students work in teams to recycle and manufacture their own recycled paper while learning how recycled paper is manufactured on a larger scale in paper facilities. Student teams evaluate current processes for creating paper and develop improvement to the procedure.	Ages 8-18
Clipper Creations Lesson Focus: Develop a working model of a nail clipper.	Ages 8-18
Cracking the Code Lesson Focus: Lesson focuses on how computerized barcodes have improved efficiency in product distribution; explores the barcoding process and engineering design.	Ages 8-18
Critical Load Lesson Focus: Lesson focuses on issues civil engineers face, including critical load and how to reinforce the design of a structure to hold more weight.	Ages 8-14
Design a Dome Lesson Focus: Lesson focuses on the engineering behind building framing for structures, and explores examples of geodesic domes and other buildings. Students work in teams to design and build a small dome frame out of everyday items that can hold a weight on top without collapsing.	Ages 8-18
Design and Build a Better Candy Bag Lesson Focus: Demonstrate how product design differences can affect the success of a final product -- in this case a bag for holding candy. Students work in pairs to evaluate, design, and build a better candy bag.	Ages 8-18
Dispenser Designs Lesson Focus: Lesson focuses on how engineers have to design objects to meet the needs of users, while considering the limitations of materials, and the implications of cost.	Ages 11-18

EEEEK- A Mouse! Lesson Focus: Lesson focuses on computer and mechanical engineering and explores how computer mice operate and how engineering provided an interface between man and machine.	Ages 8-18
Electric Messages: Then and Now Lesson Focus: Lesson focuses on exploring electric message systems, from light signals using International Morse Code to text messaging. Students construct a simple telegraph using a battery, wires, a switch, and bulb, and explore the impact of communications on society.	Ages 8-14
Electric Switches Lesson Focus: Demonstrate how electric circuits can be controlled with a simple switch. Note: This lesson plan is designed for classroom use only, with supervision by a teacher familiar with electrical and electronic concepts.	Ages 8-11
Engineer a Cane Lesson focus: Lesson focuses on how engineers improve assistive devices such as a cane to meet the needs of the elderly. Students work in teams to re-engineer a cane for a "client." They are assigned a client profile, develop a design to suit the needs of the user, and those in older grades build a working prototype of their design.	Ages 8-18
Engineer a Dam Lesson Focus: Lesson focuses on the different uses of dams and how they are engineered. Students work in teams to develop a system of damming water in a trough. The system must completely hold back the water and also have a way of executing a controlled release.	Ages 8-18
Engineered Memory Lesson Focus: Lesson focuses on the engineering behind storage devices, and engineering improvements over time. Though exploring the operation of the "floppy" disk, students explore the mechanics underlying operation, and then test the disk under a variety of conditions.	Ages 8–18
Engineered Music Lesson Focus: Lesson focuses on the engineering behind the design of musical instruments. Teams of students explore the engineering behind recorder manufacturing, and then design, construct, test, and evaluate a working musical instrument using easily found materials.	Ages 8-18
Engineered Sports Lesson Focus: Lesson focuses on how the principles of aerospace engineering have impacted golf ball design, along with equipment used in other sports. Students analyze the use of dimples on golf balls, and work as a team of engineers to determine whether adding dimples to airplanes would increase fuel efficiency for the airline industry. They also explore the physics of bounce as it relates to several sports balls.	Ages 11-18
Engineering Air Traffic Lesson Focus: Lesson focuses on the engineering behind air traffic control systems. Students work in teams to evaluate data generated for a virtual air traffic system, and determine a plan to bring three planes safely through a set airspace. They then recommend engineering enhancement to the current system.	Ages 11-18
Engineering Ups and Downs Lesson Focus: Lesson focuses on the engineering behind elevators. Teams of students explore principles and requirements of vertical travel, then design and construct a working elevator to service a toy car garage using wheels, pulleys, string, cardboard and other materials.	Ages 11-18

Exploring at the Nanoscale Lesson Focus: Lesson focuses on how nanotechnology has impacted our society and how engineers have learned to explore the world at the nanoscale. Students participate in hands-on activities to understand exactly how small the nanoscale is, explore how surface area changes at the nano scale, and work in teams to develop futuristic applications of nanotechnology.	Ages 8-14
Failure: Seeds of Innovation Lesson Focus: Lesson focuses on how failure is part of the engineering process. Students work in teams and learn about many inventions and advances in engineering were brought about after a mistake or failure. Students research an example of such an innovation and develop a presentation related to how the tenacity of the engineer allowed him or her to move past a failure and into the realm of innovation. Students reflect on the value of moving on after a failure or setback, present the results of their research to the class, and provide examples of how the innovation they researched has impacted society -- only because the engineer didn't give up.	Ages 8-18
Filtration Investigation Lesson Focus Lesson focuses on how filtration systems solve many problems throughout the world such as improving drinking water. Through this lesson, students work in teams to design and build a filtration system to remove dirt from water. Students select from everyday items to build their filter, test the resulting system evaluate the effectiveness of their filters and those of other teams, and present their findings to the class.	Ages 8-18
Find it with GPS! Lesson Focus: Lesson focuses on exploring how the development of global positioning systems has revolutionized both defense and consumer product engineering. Students work in teams to understand the technology behind GPS, explore current applications, and brainstorm new applications for global use of GPS. They use both a simple GPS handheld device and online resources to understand the functioning and potential of this engineering technology.	Ages 8-18
Fizzy Nano Challenge Lesson Focus: Lesson focuses on how materials behave differently as their surface area increases. Students learn about nanotechnology and how engineers can harness the differences in how materials behave when small to solutions for challenges in many industries. Students work in teams to explore examples of how surface area impacts functionality. They hypothesize how surface area will impact the performance of antacid tablets, conduct an experiment using whole and crushed tablets to see how they behave when introduced to water, observe what they see, extrapolate to other examples, compare their hypotheses and the results with those of other student teams, reflect on the experience, and share observations with the class.	Ages 8-14
Flashlights and Batteries Lesson Focus: Lesson focuses on the concept of electron flow through the demonstration of electrical circuits in a flashlight, and how batteries operate.	Ages 8-11
Folding Matters Lesson Focus: Lesson focuses on how the process of folding has impacts on engineering and is evident in nature. Students consider many applications of folding such as parachutes, wings in a cocoon, heart stents, and solar panels in space. They work in teams to create a model out of everyday items of a solar panel that can be folded (for transport) and expanded (in space). Students design their solar panel on paper, build it for transport, and open or test it. All teams evaluate their results, reflect on their design, and present to the class.	Ages 8-18

Get Connected With Ohm's Law Lesson Focus: Demonstrate Ohm's Law using digital multi-meters. Fun hands-on activities are presented that demonstrate Ohm's Law. Teachers use digital multi-meters to collect data that are plotted to show that voltage and current are related by linear functions for ordinary resistors and by power functions for light bulbs.	Ages 10-18
Get It Write Lesson Focus: Lesson focuses on how writing instruments have been engineered over time. Students work in teams to design and build a functional "pen" out of everyday materials that can deliver washable liquid watercolor (ink) to a sheet of paper in a controlled manner. They design their pen, build and test their design, evaluate their results, and share observations with the class.	Ages 8-18
Getting Your Bearings Lesson Focus: Lesson focuses on the concept of friction and the use of ball bearings to reduce friction.	Ages 8-18
Give Binary a Try! Lesson Focus: Lesson focuses on how binary codes function and binary applications for computer engineers. The lesson offers students an activity to learn to download software and read online binary clock, and advanced students an opportunity to build one from a kit.	Ages 8-18
Give Me a Brake Lesson Focus: Lesson focuses on brakes, force, and friction, using bicycle rim brakes to demonstrate basic braking mechanisms to stop, slow, or prevent motion.	Ages 8-18
Hand Biometrics Technology Lesson Focus: Lesson focuses on engineering applications of biometric technologies for identification or security applications. After exploring hand geometry biometrics, students work in teams of "engineers" to evaluate pros and cons of incorporating a hand recognition biometric technology into a new security system for a museum.	Ages 8-18
Heart of the Matter Lesson Focus: Lesson focuses on the engineering and operation of artificial heart valves, and the interface between man and machine.	Ages 8-18
Here Comes the Sun Lesson Focus: Lesson focuses on solar panel design, and its application in the standard calculator. It explores how both solar panels and calculators operate and explores simple circuits using solar power.	Ages 8-18
How the Rubber Meets the Road Lesson Focus: Lesson focuses on how engineers design tire treads to increase safety and reliability. Students are presented with the challenge of designing a new tire tread that will be safe when driving in rainy conditions. Student teams will design and construct a sample tread out of clay, then test and evaluate the effectiveness of the design, evaluate their results, and present their findings to the class.	Ages 8-18
Hull Engineering Lesson Focus: Lesson focuses on how the shape of ship's hull can impact its speed and stability potential in water. Teams of students design and test their own ship's hull on paper, and build it using foam and other everyday materials.	Ages 11-18

Infrared Investigations Lesson Focus: Lesson focuses on how infrared technology is used by engineers creating equipment and system for a variety of industries. Teams of students explore the application of infrared in remote controls, test materials that encourage or prevent infrared transmission, and develop systems that allow transmission of infrared in restricted environments.	Ages 8-18
Insulators and Conductors Lesson Focus: Demonstrating the concept of conducting or insulating electricity. Note: This lesson plan is designed for classroom use only, with supervision by a teacher familiar with electrical and electronic concepts.	Ages 8-11
Interactive Gumball Machine Lesson Focus: Students explore potential and kinetic energy while working in teams to design and build an interactive gumball machine.	Ages 10–18
Irrigation Ideas Lesson Focus: Lesson focuses on how through the centuries man has had the need to move water from one place to another. Engineered irrigation has proved critical throughout the world. Through this lesson, students work in teams to design and build a system to move water from one source to two different delivery areas. The challenge is to move two cups of water for at least three feet and distribute it evenly in two separate containers. They work with everyday items, develop a plan, build their "irrigation" system, and test their system. Students then evaluate the effectiveness of their own irrigation systems and those of other teams, and present their findings to the class.	Ages 8-18
Keep it Cool Lesson Focus: Lesson focuses on the engineering behind keeping food and other items cool. Students work in teams to develop a system to make an insulated liquid container that will keep chilled water as cool as possible for an hour using everyday items. Students will need to devise a way to have a thermometer rest in the water and be able to read the temperature throughout the hour. They plan their design, execute and test their system and share their experiences with the class.	Ages 8-18
Making Sense of Sensors Lesson Focus: Lesson focuses on how sensors are used in many applications to gather information about our environment. This lesson focuses on the hygrometer, a sensor used to measure humidity. Through this lesson, students work in teams to design and build a hygrometer out of everyday items to measure humidity levels. The student hygrometers are not meant to be exact, but are expected to indicate a change. Students select from everyday items to build their hygrometer, test their machine using a spray bottle to increase humidity, evaluate the effectiveness of their system and those of other teams, and present their findings to the class.	Ages 8-18
Measuring the Wind Lesson Focus: Lesson focuses on how anemometers are engineered to measure the speed of wind, and how designs have changed over time. Student teams design and build a working anemometer out of everyday products and learn about how anemometers are used for feasibility tests on locations considering alternative energy from wind turbines. Student anemometers must be able to sustain the wind generated by a fan or hairdryer at varying speed and students must develop a way to measure and chart rotations at different wind speeds. Students evaluate the effectiveness of their anemometer and those of other teams, and present their findings to the class.	Ages 8-18
Move That Lighthouse! Lesson Focus: Lesson focuses on how engineers have to evaluate multiple structural, economic, and environmental factors when moving a building.	Ages 8-18

Nano Waterproofing Lesson Focus: Lesson focuses on how nanotechnology has impacted the design and engineering of many everyday items, from paint to fabrics. Students learn about the hydrophobic effect and how similar properties can be introduced by reengineering products at the nano level. Students work in teams to develop a waterproof material and compare their results with nano waterproof materials developed recently by engineers and scientists.	Ages 8-18
Oil Spill Solutions Lesson Focus: Lesson focuses on how engineers use various techniques to provide speedy solutions to oil spills or other threats to natural water resources. Through this lesson, students work in teams to analyze an "oil spill" in the classroom, then design, build, and test a system to first contain, and then remove the oil from the water. Students select from everyday items to build their oil containment and clean-up systems, evaluate the effectiveness of their solution and those of other teams, and present their findings to the class.	Ages 8-18
Pipeline Challenge Lesson Focus: Lesson focuses on how engineers develop pipeline systems to transport oil, water, gas, and other materials over very long distances. Students work in teams of "engineers" to develop a pipeline system to transport both a golf ball and ping pong ball across the classroom terrain.	Ages 8-18
Pendulum Time Lesson Focus: Lesson focuses on how pendulums have been used to measure time and how mechanical mechanism pendulum clocks operate. Students work in teams to develop a pendulum out of everyday objects that can reliably measure time and operate at two different speeds. They will determine the materials, the optimal length of swing or size of weight to adjust speed, and then develop their designs on paper. Next, they will build and test their mechanism, compare their results with other student teams, and share observations with their class.	Ages 8-18
Playing with Parachutes Lesson Focus: This lesson focuses on parachute design. Teams of students construct parachutes from everyday materials. They then test their parachutes to determine whether they can transport a metal washer to a target on the ground with the slowest possible rate of descent.	Ages 8-18
Pollution Patrol Lesson Focus: This lesson focuses on devices that are used to detect air pollution. Teams of students construct outdoor air pollution detectors from everyday materials. They then test their devices to see how much particulate pollutants they can capture.	Ages 8-18
Popsicle Bridge Lesson Focus: Lesson focuses on how bridges are engineered to withstand weight, while being durable, and in some cases aesthetically pleasing. Students work in teams to design and build their own bridge out of up to 200 popsicle sticks and glue. Bridges must have a span of at least 14 inches and be able to hold a five pound weight (younger students) or a twenty pound weight (older students). Students are encouraged to be frugal, and use the fewest number of popsicle sticks while still achieving their goals. Students then evaluate the effectiveness of their own bridge designs and those of other teams, and present their findings to the class.	Ages 8-18
Program Your Own Game Lesson Focus: Lesson focuses on how software engineers design computer games and other software. Student teams work together to develop a simple computer program using free software that is available in multiple languages.	Ages 11-18

Pulleys and Force Lesson Focus: Lesson focuses on the concept of force and the use of pulleys to reduce required force.	Ages 8-11
Rescue Rover Lesson Focus: This lesson focuses on the tools and equipment used during technical rescue operations. Teams of students construct rescue devices from everyday materials. They then test their devices to determine whether they can rescue a puppy from a sewer.	Ages 8-11
Robot Basketball Lesson Focus: This lesson demonstrates the difference between precision and accuracy. Students design a device that can shoot a basketball free-throw shot accurately every time.	Ages 10-18
Rotational Equilibrium Lesson Focus: Demonstrate the concept of rotational equilibrium.	Ages 14-18
Rubber Band Racers Lesson Focus: The focus of this lesson is on rubber band powered car design. Teams of students construct rubber band powered cars from everyday materials. Students must design their cars to travel in a straight line for a distance of at least 3 meters within a 1 meter wide track.	Ages 8-18
Sail Away Lesson Focus: Lesson focuses on watercraft engineering and sailing. Students work in teams to design a sailboat out of everyday objects that can catch a breeze from a fan, stay afloat with a set load, and sail four feet.	Ages 8-18
Series and Parallel Circuits Lesson Focus: Demonstrate and discuss simple circuits and the differences between parallel and serial circuit design and functions. Note: This lesson plan is designed for classroom use only, with supervision by a teacher familiar with electrical and electronic concepts.	Ages 8-14
Shake it Up with Seismographs Lesson Focus: Lesson focuses on exploring how the development of seismographs has helped save lives around the world. Students work in teams to design their own seismograph out of everyday items, and test its ability to record a simulated classroom earthquake. Students evaluate their own seismographs, those of classmate teams, and present findings to the class.	Ages 8-18
Ship the Chip Lesson Focus: Lesson focuses on engineering package designs that meet the needs of safely shipping a product. Students work in teams of "engineers" to design a package using standard materials that will safely ship a single chip through the mail to the school address.	Ages 8-18
Shipping for Survival Lesson Focus: Lesson focuses on how packaging engineers develop customized shipping and packaging containers to meet the needs of many different industries. Students learn about different packages that have been engineered to transport hearts for surgery, blood for analysis, and foods to retain freshness. Students then work in teams to build a container that will allow a flower to be shipped without damage and with water using everyday items. Flowers must remain fresh and not wilted for 24 hours after being sealed in the box.	Ages 8-18

Simple Kitchen Machines Lesson Focus: Lesson focuses on simple machines and how they can be found in many everyday items. Students explore the different types of simple machines, how they work, and how they are integrated into many items. Students explore common kitchen machines and identify how many simple machine types are incorporated into each item.	Ages 8-11
Simple Machines Lesson Focus: Simple machines: their principles and uses.	Ages 8-11
Smooth Operator Lesson Focus: This lesson focuses on surgical instrument design. Teams of students construct surgical instruments from everyday materials. They then test their surgical instruments to determine how well they can perform a simulated "surgical procedure".	Ages 8-18
Solar Structures Lesson Focus: This lesson focuses on how the sun's energy can be used to heat and cool buildings. Teams of students construct passive solar houses from everyday materials. They then test their solar houses to determine how well they regulate temperature.	Ages 8-18
Sort it Out! Lesson Focus: Lesson focuses on the engineering behind industrial sorting processes. Working as an engineering group, students then work in teams to design and build a system to sort different sized coins for packaging.	Ages 8-18
Spring Scale Engineering Lesson Focus: Lesson focuses on the engineering behind building a spring scale and its use as a measuring device. Students work in teams to design, build, and test their own spring scale that can measure the weight of an apple using everyday items. They compare their designs with those of other student teams and reflect on the experience.	Ages 8-18
Statue Display Tower Lesson Focus: Students design, build, test and redesign a display tower that will meet a specific set of criteria and constraints.	Ages 10–18
Stop And Go Lesson Focus: Lesson focuses on how engineers have developed and improved traffic management over time by engineering and re-engineering the traffic light. Students work in teams to design a new traffic light system to meet the needs of a potential client. They must devise a system or technical enhancement to accommodate a busy bicycle lane and roadway that intersects a hospital emergency room entrance. As a team they devise their planned improvements, draw a design of the improved traffic signal, develop a written and verbal presentation to the client, present their designs to the class, provide feedback on other team's designs, and share observations about re-engineering.	Ages 8-18
Sticky Engineering Challenge Lesson Focus: Lesson focuses on how engineers work to solve problems and impact daily life through new and improved products. As engineers do, teams of students select adhesive options to help them meet a construction goal.	Ages 8-18
Sugar Crystal Challenge Lesson Focus: Lesson focuses on surface area and how the shape of sugar crystals may differ as they are grown from sugars of different grades of coarseness. Students explore surface area, nanostructures, and work in teams and participate in hands-on activities.	Ages 8-14

Tall Tower Challenge Lesson Focus: Lesson focuses on the growth of tall buildings and their structures. Students work in teams to develop the tallest tower they can build with limited materials that can support the weight of a golf ball for two minutes. They develop a design on paper, build their tower, present and test their tower to the class, evaluate their results and those of their teammates, and complete reflection sheets.	Ages 8-18
Temperature Tactics Lesson Focus: Lesson focuses on how thermometers have been impacted by engineering over time, and also how materials engineering has developed temperature sensitive materials. Student teams design and build a temperature gauge out of everyday products and test a variety of materials for thermal properties. Students evaluate the effectiveness of their temperature gauge and those of other teams, and present their findings to the class.	Ages 8-14
Tennis Anyone? Lesson Focus: Lesson focuses on sports engineering and advanced materials development. Students work in a team to devise a racquet out of everyday materials that could be used to volley a ping pong ball across a table against an opponent's racquet. Students design their racquet on paper, build the racquet, and test it against those made by other student teams. All teams evaluate their results, reflect on their design, and present to the class.	Ages 8-18
Tinkering with Tops Lesson Focus: In this lesson, students build spinning tops out of everyday materials. Their challenge is to design a spinning top that can spin for at least 10 seconds within a circle 30 cm in diameter.	Ages 8–18
Toxic Popcorn Design Challenge Lesson Focus: This lesson introduces students to the engineering design process (EDP)—the process engineers use to solve design challenges. Students work in teams to solve the challenge by designing both a product and process to safely remove "toxic" popcorn and save the city.	Ages 8–18
Trebuchet Toss Lesson Focus: This lesson focuses on trebuchet design. Teams of students construct trebuchets from everyday materials. They then test their trebuchets to determine the farthest distance they can hit a target with a marshmallow projectile.	Ages 12–18
Two Button Buzzer Circuit Lesson Focus: Demonstrate how two switches interact in an electrical circuit such as that used to sound a buzzer. Note: This lesson plan is designed for classroom use only, with supervision by a teacher familiar with electrical and electronic concepts.	Ages 8-14
Using Ohm's Law to Build a Voltage Divider Lesson Focus: Students will design, build, and characterize one of the basic circuits of electrical engineering, the voltage divider. These circuits produce a wide range of output voltages and are building blocks for more complex circuits. Circuit design will emphasize the concepts of Ohm's Law and students will explore mathematical relationships of parallel and series resistors. Students will demonstrate their design efforts by building prototype circuits and using test measurement tools to confirm their predictions.	Ages 14-18
Water Fountain Lesson Focus: This lesson demonstrates how a hydraulic pump works. Students work in teams to design and build a unique water fountain that employs a hydraulic pump.	Ages 10–18

Water Tower Challenge Lesson Focus: Lesson focuses on water storage and how engineering helps communities preserve and supply water to populations. Students work in teams to design and build a water tower out of everyday materials that can "supply" and "shut off" water as needed. The system will need to deliver water in a controlled manner to a paper cup that is about 36 inches or 90 cm away in a controlled manner. They design their tower, build and test their system, evaluate their results, and share observations with their class.	Ages 8-18
Waterproof That Roof! Lesson Focus**:** Lesson focuses on how structural engineers have improved the designs of building -- specifically roofing -- over the years to improve the quality of homes and life. Teams of students work together using simple materials to design a roof that will keep the contents of a box dry during a water test. Students determine both the shape of the roof and materials used for construction, test their designs, and present their findings to the class.	Ages 8-18
What is a Nanometer? Lesson Focus: Lesson focuses on how to measure at the nano scale and provides students with an understanding of how small a nanometer really is."Students learn about electron microscopes, participate in hands-on activities to measure common classroom objects in the metric scale, and then convert the result to nanometers.	Ages 8-12
Wind Tunnel Testing Lesson Focus: Lesson focuses on wind tunnel tests that engineers in many industries use to when developing products such as airplanes, cars, and even buildings. Teams of students build their own model car out of everyday products and test their design in a wind tunnel made of a fan blowing through a long cardboard box.	Ages 11-18
Working with Watermills Lesson Focus: Lesson focuses on how watermills generate power. Student teams design and build a working watermill out of everyday products and test their design in a basin. Student watermills must be able to sustain three minutes of rotation. As an extension activity, older students may design a gear system that is powered by the watermill. Students then evaluate the effectiveness of their watermill and those of other teams, and present their findings to the class.	Ages 8-18
Working with Wind Energy Lesson Focus: Lesson focuses on how wind energy can be generated on both a large and small scale. Student teams design and build a working windmill out of everyday products and learn about anemometer and site testing. Student windmills must be able to sustain the wind generated by a fan or hairdryer at medium speed at 2 feet and rotate, lifting a small object upward. Students evaluate the effectiveness of their windmill and those of other teams, and present their findings to the class.	Ages 8–18