BEST Medicine Engineering Fair Environment Project Ideas

Grade	Category	Project	Comments
All	Sustainability	Rain barrels catch rain fall and store it. Is there a way to use sensors and solar panels to open and close the rain barrels to water dry soil?	Create a system that measures the level of water in the soil and uses solar panels to automatically open and close a valve on a rain barrel leading to the soil.
All	Preservation/ Pollution	Salamanders are an indicator species. This means that when salamanders are present in any set environment, it is considered a healthy environment	Perform a survey study that related the number of salamanders in a given, set environment to the pH of the soil in that environment. (Determine at what soil pH, salamanders begin to die).
All	Pollution	Oil companies currently pay an overarching tax to drill for oil in a specific area. This tax is used to clean up after years of drilling and recap the drilled holes. The problem is, it is not sufficient to fully repair and replenish the environment	Derive a mathematical model to determine what tax an oil company should pay each month based on the number of gallons that are removed from the area, as well as clean up after the company leaves.
All	Sustainability/ Pollution	Some grocery stores have started using compostable bags as an alternative to the normal plastic grocery bags we see in stores. Are these plastic bags really compostable?	Find 5 different brands of compostable bags from grocery stores and perform an experiment to determine which compostable bags are best. Use a ranking system to show which bags are most compostable.
All	Sustainability	Grey water is water that is used in your shower or sink, goes down the drain and does not get reused.	Find a way to reuse grey water after it goes down the drain.
All	Pollution/ Preservation	Some sunscreens have been determined to cause detrimental harm to coral reefs. There have been multiple brands come out with sunscreens that are supposed to be safe for coral reefs.	Determine the effectiveness of 5 different sunscreens from different brands that are marketed to be safe for coral reefs.
All	Pollution	Trash being thrown on shorelines/beach/ and by the river is a major concern. There are multiple initiatives to clean up the beach's and rivers.	Quantify and rank trash by type on a given beach/shoreline/river. Determine which areas most commonly have what type of trash.

All	Recycling	Construction companies leave behind a lot of trash/waste product that must go to a landfill.	Create a way to reuse construction waste (such as paper backings, pieces of drywall, screws, concrete blocks).
All	Pollution/ Recycling	Sound barrier walls are used on highways in urban areas to reduce the amount of noise from the highway into the residential areas. However, if you live close to these walls/the highway it is still quite loud.	Come up with a material to add into/on top of the current sound barrier walls that will better protect the surrounding residences from noisy traffic.
All	Pollution/ Ecosystem	The same city can have fluctuating temperature of up to 20 degrees, this is due to environmental factors such as how much greenspace is in the area vs. how much concrete is in the area.	Survey the temperatures of different environments in the same city. Determine how they are related to green spaces vs. concrete presence.
All	Sensors/ Ecosystem	Scientists are developing sensors that can be used in distant ecosystems to determine different values of pH/rainfall/heat in area of the world they cannot be close to physically and manually measure.	Develop a sensor that can measure either rainfall for places such as the amazon, or heat in places such as a dessert that can transmit this data accurately to a computer that may be thousands of miles away.
Grades 9-12	Pollution	Bioremediation scientists have started developing microbes that would potentially be used to clean up different types of pollution.	Create a bioremediation microbe that has the capability of absorbing an oil spill in the ocean.
Grade 6	Ecosystem	Categorizing animals based on their ability to thrive in different biodomes	Categorize species of animals based on what type of environment/ecosystem they thrive in best, as well as types of nourishment that will need to be present in that environment.
Grades 6-9	Recycling/ Technology	People have started recycling more and more, but the issue is, no one knows how to properly sort their recyclables. This causes an issue because you can't recycle certain types of plastic/cardboard/paper together as they have different material properties.	Create an app that allows a person to snap a picture of their recyclables and it tells them exactly what type of plastic/carboard/paper/metal it is, so they know exactly what bin to put them in at the recycling center.

All	Sensors/ Preservation/ Ecosystem	Wildfires are prevalent in areas like California and are very difficult to put out once they have started.	Create a sensor that detects the humidity, and temperature and quantifies wildfire risk based on these values.
All	Pollution	Are electric cars better for the environment than traditional gas powered cars?	Quantify the amount of fossil fuels used by an electric car and the emissions it produces in one day, then compare that to that of a traditional gas-powered car.
All	Sensors/ Ecosystem	There are currently a few ways to measure air quality, but is there a better/faster/cheaper alternative that could be employed?	Create a new way to measure air quality and quantify it.
All	Pollution	Pollution from cars is a major concern for air quality. How do we know which types of vehicles contribute the most pollution to our environment?	Create a mathematical model to quantify pollution emitted by car type SUV, Sedan, Pick-up truck, Box truck, Semi), and brand Ford, Hyundai, Honda, Chevrolet, etc.).
Grades 9-12	Sustainability/ Recycling	Clean drinking water is an issue all over the world. One of the biggest sources of water is the ocean, however it has salt in it which would cause dehydration if a person were to consume it.	Formulate a method of desalinating ocean water so that it may be consumed by humans.
All	Sustainability	The cosmetic industry uses microbeads in many different products like body wash, and face masks, these microbeads are generally made of plastic and get sent down the shower or sinks drain, leaving plastic in the greywater.	Create water soluble plastic microbeads that can be used in cosmetic products.
All	Recycling/ Pollution	The cosmetic industry creates a large amount of waste with their packaging.	Find a way to reuse this packaging or make a line of compostable makeup packaging.
All	Recycling	Livestock waste has been used for centuries as fertilizer. However, most people don't have access to livestock for natural fertilizer.	Create a method of purifying and packaging clean livestock waste that could be purchased by the bag at a store such as Lowes or Home Depot.

All	Sensors/ Recycling	Rain barrels are used to collect rainwater from gutters on a house. This water is generally pretty clean and could be used for many different things.	Use sensors and valves to allow rain barrels to supply toilets with rainwater.
Grades 9-12	Ecosystem/ Sensors	Chemicals in soil can be dangerous to humans and pets depending on the chemical and if the levels are high enough.	Create a biosensor that detects the levels of different toxic chemical in soil and quantifies that pollution level of that soil.
Grades 9-12	Pollution/ Sustainability	Biomasses are natural products that can be used to create biofuel, such as syngas, biogas, bioethanol, and algae gas.	Determine which biomasses would create the best biofuel in terms of power and longevity.
Grades 10-12	Sustainability/ Ecosystem	Glues, and other adhesive can be quite toxic to humans as well as to the environment.	Formulate an environmentally friendly bio adhesive.
Grades 10-12	Pollution	Even when water is treated thoroughly at a water treatment plant, it will still contain some nanoparticles.	Determine what these nanoparticles are and how harmful they may be to the environment.
All	Pollution	Heating methods are becoming increasingly expensive and use a large amount of fossil fuels. What if there was a way to heat a room/house for free with a solar air heater?	Create your own solar air heater and test it in one enclosed room by how long it takes to heat up the room by 10 degrees. Compare it to traditional heating methods.
Grades 11-12	Pollution/ Toxicity	The earliest known bioassay is a canary which were taken down into coal mines with the workers to detect methane gas because these birds are extremely more sensitive to it than humans are.	Use bioassays to determine the toxicity of household chemicals/cleaning products.

All	Ecosystem	The world is constantly changing over time, but how much has our environment changed in the last 10 years?	Interpret long term data of a specific lake or ecosystem and investigate the change over time.
Grades 9-12	Ecosystem/ Pollution	Hydroponics is an alternative method for growing plants by omitting soil and using solely water to grow the plants.	Asses the quality and quantity of hydroponic plants vs, traditional plants, and determine if it would be suitable for farmers to use this method over traditional for commercial food growth.
Grade 6-8	Ecosystem	Is the type and quantity of algae that grows in a lake related to the air quality or rain fall in that area?	Survey a stream or lake for algae content (type and quantity) which can be tracked for multiple years and compare it to air quality/rain fall/etc.
All	Ecosystem	Allergies can be an issue for many people. To be able to determine where you would have the most risk of ad allergy attack would be helpful to people struggling with this issue.	Track pollen content in an area (from available data) and quantify the allergy risk in that area
All	Ecosystem/ Sensors	Currently pollen is tracked with a sticky rod called a roto rod used by weather channels and is very expensive.	Create a new system for quantifying pollen in the air that could be mass produced for everyday people to use.
All	Ecosystem	Invasive species of plants are generally aggressive and can often overpower the indigenous species which reduces biodiversity.	Monitor vegetation in an area and determine which plants are indigenous vs. invasive species.
All	Ecosystem/ Pollution	Some natural deer repellent for plants includes hair, decaying fish, garlic, and sewage.	Create a deer repellent to protect indigenous plants in an area without harming the deer population.
All	Ecosystem	Pet waste being left in public areas can be detrimental to environments.	Create a way to incentivize pet owner to clean up their pet's waste in public areas.
All	Recycling	Plastic food and drink containers are not biodegradable and can increase landfill use and spillage into the ocean.	Create a way to reuse/compost/repurpose plastic food and drink containers.

All	Erosion	Soil erosion is a big issue for the environment.	Create a way to stop soil erosion
All	Erosion	Dolos are large piece of concrete designed to be stacked on top of each other and placed on a beaches shoreline to protect it.	Survey dolos vs. alternative designs
All	Recycling	Aluminum hair spray containers are one time use and can take up a lot of room in a landfill.	Create a way to reuse aluminum hair spray containers
All	Ecosystem/ Sensor	Air quality is important to people with compromised lungs. Is there a way for them to test air quality for themselves?	Create a way to measure and rate air quality.
Grades 9-12	Sustainability/ Sensors	Chemicals in soil can be dangerous to humans and pets depending on the chemical and if the levels are high enough.	Create a biosensor that detects levels of chemicals in the soil and quantifies the pollution of that soil.
Grades 9-12	Sustainability	When chemicals are manufactured it can create pollution and other environmental impacts.	Create a sustainable bioprocess for the production of chemicals.
All	Sustainability/ Pollution	Instead of having to compost or reuse plastic food and drink containers, create biodegradable packaging.	Create sustainable biodegradable packaging.
All	Sustainability/ Pollution	Fertilizers can contain harsh chemicals that can have the opposite effect of what is should in specific plant species. Is there a way to create a fertilizer that does not contain harsh chemicals?	Create a low impact fertilizer.

All	Sustainability	Universities use a lot of power, water, paper and create pollution that can hurt the environment.	Find a way that universities can be more eco-friendly and show what the environment surrounding it would look like.
All	Pollution/ Ecosystem	Magnets can have ferrous attractive forces that would allow them to attract and hold oil.	Create a magnet that attracts oil and determine if it would be a viable way to clean oil spills.
All	Recycling/ Pollution	One-time use depends/disposable diapers fill up landfills fast and are not biodegradable which poses a threat to our environment.	Create a way to reuse/compost depends/diapers.
All	Recycling/ Pollution	The cosmetic industry produces on time use makeup wipes, and they end up in landfills or in the ocean. Is there a way to break down these/reuse these wipes?	Create a way to reuse/compost makeup wipes.
All	Recycling	Mail that contains personal information is generally shredded or thrown away to go to a landfill. Is there a way to safely recycle this mail without someone stealing the information?	Find a way to create safe recycling for mail containing personal information.
Grade 6	Pollution	It is a general understanding in the community that metal water bottles save a lot of plastic from going into landfills or spilling over into the ocean, but by how much?	Survey your class based on whether they use metal or plastic water bottles and create a mathematical model to determine how much plastic is being saved from spillage into the ocean.
Grades 9-12	Ecosystem/ Pollution	Ocean acidification is the uptake of carbon dioxide from the atmosphere into the ocean, changing the pH of the water. This can pose a danger to all living creatures in the water and will further decrease biodiversity.	Find a way to deter ocean acidification.
Grades 9-12	Ecosystem/ Pollution	Phosphorus and Nitrogen cycles help promote the growth of algae in lakes. However, human activities and pollution may decrease the number	Determine how much human activities effect phosphorus and nitrogen cycles and how it affects algae growth.

		of cycles and lead to less algae in lakes and rivers.	
All	Pollution/ Ecosystem/ Preservation	The ozone layer is being depleted each year by a percentage. At some point, without this ozone layer we will no longer be able to live on earth.	Create a mathematical model that will show when the ozone layer will be so depleted that earth will be uninhabitable.
All	Ecosystem	Overfishing is the deduction of a specific species of ocean animal from its environment, before it can naturally replenish its population.	Create a mathematical model that shows how many fish of a specific species can be removed from the sea before they become extinct due to not being able to replenish the population naturally
All	Preservation/ Ecosystem	Genetically modified foods are bioengineered foods that have had changes made to their DNA.	Determine how genetically modified foods change and impact the environment.
All	Pollution	Radiation leakage is ionizing radiation transmitted through the protective shielding of a radiation source other than the primary beam.	Determine a way to stop radiation leakage.
All	Ecosystem	Do extreme weather conditions such as the recent hurricane Ian hurt the environment more than on a surface level?	Create a way to quantify how bad extreme weather incidents such as hurricanes and tornados affects the environment.
All	Pollution/ Ecosystem	How has tourism changed environments? Is it harmful or helpful to the environment?	Show how tourism impacts the environment.
All	Sustainability	Hydropower is the use of fast flow of water to create energy.	Compare the pros and cons of hydro energy and find a way to better it from these cons.
All	Sustainability	A fuel cell is an electromechanical cell that converts chemicals such as hydrogen into efficient energy.	Are hydrogen fuel cells a viable source of energy and how can it be used to better the environment.

All	Pollution	Microplastics can be in any plastic food and drink containers, what percentage of our water from plastic water bottles is actually microplastics?	Perform an experiment to determine and quantify the amount of microplastics in an individual water bottle.
All	Pollution	Fracking has been blamed for the leakage for millions of tons of methane gas, which is a gas even more potent that carbon dioxide.	Determine the impact of fracking on the environment and how to improve this.
All	Pollution/ Preservation	Nuclear warfare is a real possibility in the world today. If our homes were to be in the surrounding areas of a nuclear attack, how could we best prepare our homes to protect us?	Determine what the environment would look like after a nuclear attack and what would be the best preparation to protect one's home.
All	Pollution	Overpopulation is an issue in many areas. Is there a relationship between population size and air quality/water quality/overall environment?	Show the relationship between population size and the air quality/water quality/environment.
All	Pollution/ Preservation	The moon and stars, guide migrating birds to their winter destination, but how does artificial light change this?	How does artificial light confuse migrating birds and how can we combat this?
All	Preservation	Pollinating species are insects such as bees. Their population is decreasing, what will happen to the environment with less and less pollinating species to continue the work?	Create a mathematical model to show the effects of the decline in pollinating species.
All	Pollution/ Sustainability	Biodiversity is the diversity of species in an environment and is very important for the ecosystem to thrive.	Determine and rank different cities by biodiversity and explain the pros of biodiversity.
All	Preservation	Flooding causes surface defects to the land, but does it do enough damage to cause the land to be unusable?	Show the effects of flooding on land utilization.

All	Preservation	Deforestation is a prevalent issue for the environment. What are the causes, effects, and how can we stop this?	Determine the causes and effects of deforestation and new control strategies.