

EXPLORE ENGINEERING

LAB OPTIONS | SPRING 2020

Amplify Your Creativity

Ever wonder how to turn one good idea into a hundred possibilities? When generating new ideas for products and services, most people rely on brainstorming alone. Brainstorming is a good way to start, but there are other techniques that are much more fun and creative that greatly increase the quantity and quality of novel ideas. In this highly interactive session, we'll explore three additional techniques to generate ideas for an everyday medical device (stethoscope).

Biomedical Sensors and Instrumentation

Biomedical engineering is the application of engineering design principles to the fields of medicine and biology. Understanding anatomy and physiology is the key to a successful design of sensors and instrumentation used for health care diagnosis and preventative care. In this module, students will learn about the cardiac electrophysiology and biomechanics of the human heart and build an electronic circuit to monitor heart rate using photoplethysmography, an optical technique used in wearable health monitors and fitness trackers.

Civil Engineering Materials and Design

Materials used in civil engineering projects can be man-made, such as concrete and geosynthetics, and /or natural, such as soil and rock. Various properties of these materials are needed for the design of projects. What kind of tests and how are they done to obtain the properties of these materials? Let's find out . . .

Computer Hardware Design: Digital Systems

In this digital lab session, we help students understand how information is coded in digital format and provide students an introduction into hardware description language (HDL). Begin to code and implement basic digital designs on a prototyping development board.

Environmentally Friendly Food Preservation

Preservation and storage of fresh food is essential, but current techniques, such as freezing fresh vegetables, are energy intensive and bad for the environment. An attractive alternative uses encapsulation to seal fresh food inside a thin, edible coating. In this hands-on module, participants will learn about the principles of food encapsulation and oxygen diffusion by using natural, biological-based thin coatings to encapsulate different types of fluids.



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Mechatronics

Today's engineers often need to understand how a product's mechanical designs, electrical circuits and programmed functions interact. The area of mechatronics is the study of this intersection. The Mars Rover, autonomous cars, prostheses or drones are possible product examples. In this experiential learning module, powered origami structures are constructed and emphasize designing mechanical and electrical parts that work together and incorporate creative or artistic flair.

Product Development and Prototyping

There are many steps in the engineering design process between an idea and the final product production. Prototyping is one critical step in the creative design process. Learn about the product development process and build your own functional electro-mechanical prototype.

Solar Energy

Solar energy is not only a clean and renewable source of energy, but for those in developing countries without an electric grid, it also represents perhaps the only source of electricity. Explore the basic workings of the science and technology behind solar photovoltaic electricity by assembling and testing a solar cell apparatus connected to a real electrical circuit.

Using Work Measurement Techniques to Improve Process Productivity

Learn how to minimize waste to improve the efficiency of a process using work measurement and productivity improvement techniques. Students will use skills learned to determine the most efficient way to assemble a product resulting in a cost reduction analysis of the process. Applications in healthcare, financial and manufacturing industries will be presented.

Water Sense: Sampling, Testing and Treating Water

Participants will experience how environmental engineers design, manage, and evaluate devices and processes to create solutions to provide clean water resources and drinking water for the protection of human health and the environment. Various types of pollutants can contaminate river water by accumulating at different depths or regions of a river. Using various materials, participants will design and test a water sampler capable of collecting water from different depths of water. Participants will also test the quality of the river water at different depths and experience water treatment demonstrations.

