

# EXPLORE ENGINEERING



## LAB OPTIONS | SPRING 2019

### **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 and 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 (stethoscopes).

### **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 key to the successful design of sensors and instrumentation used for health care diagnosis and preventative care. In this module, students will learn about cardiac electrophysiology and biomechanics of the human heart and build an electronic circuit to monitor heart rate using Photo plethysmography, an optical technique used in wearable health monitors and fitness trackers.

### **Fight Hunger in Dayton with Operations Research**

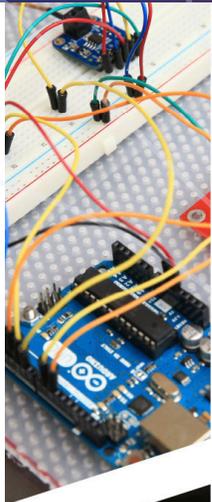
Locally, more than 120,000 people are food insecure - that is, they do not have consistent access to a sufficient quantity of affordable, nutritious food. Therefore, the Foodbank works to alleviate hunger in the Miami Valley through the acquisition, storage and distribution of food to more than 100 partner agencies. In addition, they receive food donations from more than 50 local retailers. In this hands-on laboratory experience, students will optimize truck routes for donation collection to reduce operational costs for the Foodbank.

### **Mechatronics**

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

### **Paper Recycling and the Environment**

Engineers make everything from baby food to gasoline to paper! Learn about paper and the environment, then try your hand at making recycled paper in this fun, hands on module.



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### Product Development and Prototyping

There are many steps in the engineering design process between an idea and 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.

### Robots and Sensors

Robots need sensing capabilities so they can explore and understand their environment and to automate a given task. Robots are important to various tasks such as responding to a crisis situation or manufacturing products. In this session, students will build and program LEGO robots that use various sensors. This session also includes a tour of our Robotics Lab, showing sensors applied to industrial robots.

### 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 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.

### Structural Materials

What provides strength to our buildings? Familiar materials like concrete and steel, modern creations of composites, and even the soil under our feet become the test subjects in these laboratory spaces.

### Water Sense: Sampling Testing and Treating Water

Participants will experience how environmental engineers design, manage, 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.

