

# EXPLORE ENGINEERING

LAB OPTIONS | FALL 2021



## Designing an Effective and Efficient Workflow

Are you curious about how industrial engineers optimize waiting lines at Disney World to ensure you do not miss your ride? Are you interested in knowing how queuing models are used to minimize COVID-19 vaccine wait times? This module will expose you to how Industrial engineers use queuing models to design effective workflows at places such as amusement parks and restaurants to minimize wait time.

## Practical Design of Electronic Circuits

Light-Emitting Diodes (LED) are used in traffic lights, domestic lighting, remote controls and a lot of everyday products. Are you curious about how LEDs in flashlights work? Are you interested in building your own flashlight with LEDs? In this module, you will build a functioning flashlight with electrical components such as resistors, light emitting diodes (LED) and switch.

## 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.

## 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).

## The Search for Safer Lithium-Ion Batteries

Search for a safer and more efficient lithium-ion battery for future generations. This demonstration will include a definition of a battery, components of Li-ion battery, making of a Li-ion battery cell, testing of a Li-ion battery, what we are doing to make Li-ion safer and more efficient, applications (hand-held electronics, power tools, electric car, electric aircraft, space battery), and opportunities to work in the UD/UDRI battery lab.



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### **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.

### **Biomechanics**

Engineers not only design, but they often do data collection for product testing, quality checks, or research studies. During this hands-on experience focused on engineering experimentation and biomechanics, students will learn and use innovation methods to come up with biomechanical-related research questions about human balance and postural control. We will then use laboratory-grade research equipment to collect and analyze data that answers these questions.

### **Design for Manufacturability**

Students will disassemble a desk fan and go through a design for manufacturability (DFM) process to analyze and improve the product. As part of this module, they will learn mechanical calculations, quality, and manufacturing process to develop a better product.

### **Water for Life**

Clean water is a fundamental need, yet over 750 million people do not have access to an improved water source. Water professionals around the world work to provide adequate sanitation facilities, source water protection, and drinking water treatment in ways that can be economically managed by the local community. In this session, you'll operate several water treatment methods that might be used in undeveloped regions. Compare "low tech" field tests with more advanced analysis currently used in U.S. treatment plants or research labs.

### **Aerospace**

Have you ever wondered how: planes fly, rockets carry enormous loads to space, wind tunnels produce supersonic flows, weather works, blood flows, wind turbines harvest energy, boats float, etc.? Well, the answer is magic...just kidding! The answer has to do with the study of how fluids move and behave (i.e., aerospace engineering). This topic of study has a lot of overlap with mechanical engineering but takes more time diving into the physics of fluid movement in the world. You will experience a taste of this subject throughout this learning module.

