

## SPRING 2017

Marquette Engineering Outreach is excited to offer another season of programs for students interested in learning about ENGINEERING! The Office of Engineering Enrollment Management and Outreach seeks to enhance the mission of Marquette University and the College of Engineering by developing and preparing future Marquette engineers to be critical thinkers, problem solvers and leaders that will contribute to a global society.

**To register for a Marquette Engineering Outreach Program, please visit:**  
[http://www.marquette.edu/engineering/academies\\_register.shtml](http://www.marquette.edu/engineering/academies_register.shtml)

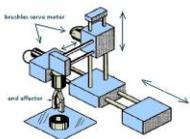
*Engineering Academy registrations are accepted on a first-come, first-served basis.*

*Waiting lists are started once a class reaches capacity. Instructions for submitting payment are provided on the registration site. For more details about our programs, including current course availability, visit [www.marquette.edu/engineering/academies.shtml](http://www.marquette.edu/engineering/academies.shtml)*

### **Battle Bots: Design & Repair** Saturday, January 28

**Grades 7-10**  
9am-3pm

**\$90**  
Class Capacity: 14



Sparks fly, motors scream, and losers weep ... Battle Bots are an exciting and challenging part of robotics competition. In this class the students will learn the types of Battle Bot competitions, how the Bots are designed, built and .. yes .. sent into battle. Using a number of pre-constructed Battle Bots, students will carry out some final assembly, testing and operation with the objective and determining which survive. To level expectations .. no fire will be used and the weapons will be made out of wood rather than hardened steel.

### **STEMming with Hanna & Allison: Electricity & Magnetism** Saturday, January 28

**Grades 3-5**  
9am-Noon

**\$45**  
Class Capacity: 16

Electricity and magnetism are both part of our everyday lives, but we may not understand exactly how they work. In this class, students will learn some basic information about electricity, electrical engineering, magnetic fields and electromagnetic energy. Students will use hands-on activities to explore the world of electricity. They will also learn how electricity and magnetism are related. Get ready for a fun and electrifying morning! NOTE: This course is intended for students in grades 3-5. For students in grades 7-10, we offer "Exploring Electricity" later in the spring, which incorporates more advanced exploration.



### **Enter a Virtual Reality** Saturday, February 4

**Grades 6-10**  
9am-3pm

**\$90**  
Class Capacity: 16

Enter the virtual world of games, places and really strange things using the latest virtual reality hardware ... HTC Vive, Oculus Rift, Playstation VR, Gear VR and Google Cardboard. In this class the students will learn about how virtual reality images are created using the Unity software. They will experience each of the implementations of virtual reality using the head set and hand controllers of the latest systems. Finally, they will learn some of the techniques of creating 360 degree virtual videos using cameras specifically designed for this purpose.



**STEMming with Hanna & Allison: Fluids**  
**Saturday, February 18**

**Grades 3-5**  
**9am-Noon**

**\$45**  
**Class Capacity: 16**

In this class, students will learn about fluids and fluid dynamics in a fun, inquiry-based setting. Through a series of demonstrations and hands-on activities, students will gain a solid understanding of what a fluid is, how they behave, and how their unique properties can be lots of fun to explore! Get ready to “go with THE FLOW” and dive into the weird and wacky world of fluids!



**Introduction to LEGO MINDSTORMS EV3 Robotics**

**Session 1 – March 4**

**Session 2 – April 29**

**Grades 5-7**

**9am-Noon**

**9am-Noon**

**\$45**

**Class Capacity: 16**

**Class Capacity: 16**

**Session 1 and 2 are same program, please do not register for both.**

Students will be introduced to the latest generation of LEGO MINDSTORMS by **designing, building, and programming** LEGO MINDSTORMS EV3 robots. Students will work in pairs to “teach” their robots to perform specific tasks using a combination of external sensors and internal programming instructions. In this workshop format, students new to the EV3 will receive introductory lessons and guidance while those more experienced with the EV3 can work on advanced and independent projects of their choice. Prior experience with robotics is NOT required – all learners are welcome! To see more about the LEGO MINDSTORMS EV3, visit <http://mindstorms.lego.com>.



**Exploring Electricity**

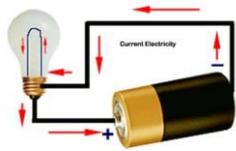
**Saturday, March 4**

**Grades 7-10**

**9am-Noon**

**\$45**

**Class Capacity: 16**



In this class, students will learn some basic electrical engineering theory about static electricity, current, and magnetic fields. Students will explore common electric devices such as motors, magnets, hair dryers, and even computer chips! Students will build their own electrical circuits and observe electrical energy in action! The class will include several *electrifying* demonstrations and hands-on activities. Students will leave with a greater understanding of things they use every day!

**WeDo LEGO Robotics**

**Saturday, March 11**

**Grades 2-4**

**9am-Noon**

**\$45**

**Class Capacity: 16**

Students can build animals, soccer players and more, and then add movement with fun, simple, drag-and-drop software created in LabVIEW. The LEGO Education WeDo platform redefines robotics for younger ages, making it possible for primary school students to build and program their own robots. In *WeDo LEGO Robotics*, students will build LEGO models featuring working motors and sensors; program their models; all while having fun developing their skills in science, technology, engineering, and mathematics. *WeDo LEGO Robotics* provides a fantastic hands-on learning experience that actively engages children’s creative thinking, teamwork, and problem-solving skills.



**Build-A-Bridge Workshop**

**Saturday, April 1**

**Grades 8-10**

**9am-Noon**

**\$45**

**Class Capacity: 16**

Engineers Without Borders is a student organization at Marquette seeking to build a better world through engineering projects that empower communities to meet their basic human needs and equip leaders to solve the world's most pressing challenges. While EWB USA chapters typically build electricity and water projects, the Marquette University chapter has made its name as "the bridge chapter," having designed and implemented several bridge projects in recent years. Come join members of the chapter for a fun morning of engineering as we dive into bridge design and expose aspiring engineers to some of the unique challenges of implementing design projects in third world countries!



**STEMming with Hanna & Allison: Engineering & The Senses** **Grades 3-5**  
**Saturday, April 1**

**9am-Noon** **Class Capacity: 16** **\$45**



Taste, smell, touch, vision, hearing... We use our senses every moment of every day! If you've ever wondered about how your senses work, then this is the class for you! Engineers, especially those interested in biomedical careers, must have a good understanding of our five senses. In this class, students will learn more about their senses through a series of fun, hands-on, and interesting experiments, activities, and demonstrations!

**Advanced WeDo LEGO Robotics (Prior WeDo Experience Required)** **Grades 2-4**

**Session 1: Saturday, April 22**

**9am-Noon**

**Class Capacity: 16**

**Session 2: Saturday, May 13**

**9am-Noon**

**Class Capacity: 16**

**Session 1 and 2 are same program, please do not register for both.**

Engineers use their knowledge and experience to creatively solve problems and improve current designs. In this course, students will use their prior experience with the LEGO WeDo platform to design, build, and program robots from their own imaginations. The students will be challenged to complete one or more fun and interesting tasks, such as creating an accurate catapult, building a crane to lift objects, or designing a moving vehicle. Students will be introduced to basic machine design concepts and will learn some advanced WeDo programming functions.



**An Introduction to 3D Printing**  
**Saturday, April 8**

**Grades 7-Adult**  
**9am – 3:00 pm**

**Class Capacity: 12** **\$90**



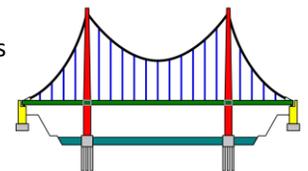
3D printing is an exciting new capability that is now possible through many relatively low cost products. In this class, students will learn how basic 3D printers work and will see a PrintrBot 3D printer in operation. Through class exercises, students will also learn how 3D CAD software, such as Autodesk Inventor, can be used to create the 3D printer output. Students will even have the opportunity to design and print their own creation.

**Bridges & Structures**  
**Saturday, April 22**

**Grades 5-7**  
**9am-Noon**

**Class Capacity: 16** **\$45**

Join Engineers without Borders for day of fun and building. Civil engineers design many different types of bridges and structures — some bolted firmly in place and some that move. In *Bridges & Structures*, students will explore **civil and structural engineering** concepts used to design and construct many of the things you see every day! Activities may include virtual bridge modeling challenges using West Point Bridge interactive software, building gumdrop structures strong enough to hold a stack of books, and K-NEX models of several different kinds of bridges.

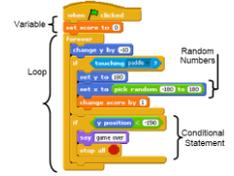


**Learn Scratch**  
Saturday, April 29

**Grades 6-8**  
9am-Noon

**\$45**  
Class Capacity: 16

Scratch is used by students, scholars, teachers, and parents to easily create animations, games, etc. and provides a stepping stone to the more advanced world of computer programming. Students will learn “Scratching” program language to make their own stories, games, and animation. Participants will learn to think creatively, work collaboratively, and reason systematically in this course. Become junior software engineers – all while having lots of fun!



**STEMming with Hanna & Alison: World of Biomedical Engineering**  
Saturday, May 6

**Grades 3-5**  
9am-Noon Class Capacity: 16

**\$45**

This course will introduce students to the amazing world of biomedical engineering through a series of discovery activities and hands-on experiences. Students will explore the human skeletal system and design a “replacement joint” that will be tested for durability. They will learn about the electrical nature of the human nervous system and see how electrical circuits operate. Lastly students will be develop a simple application on a tablet.



**Making Things Happen with the Raspberry Pi**  
Saturday, May 6

**Grades 7-10**  
9am-3pm

**\$90**  
Class Capacity: 16



Raspberry Pi is a simple to use, low cost and yet powerful computing system that can be used for graphics, sounds, robots and other fun applications. It can be programmed in numbers of languages and used as a stand alone system or integrated in larger computing systems. In this class the students will learn through individual, hands on activities, how to set up a Raspberry Pi system and program it to do a number functions using the Linux OS and Java. The functions will include how to create sounds, drive motors and monitor a variety of sensors.



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