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.

**Exploring Electricity**
Entering Grades 5-8  $45
Saturday, January 30  9am-Noon  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**
Entering Grades 2-4  $45
Saturday, February 6  9am-Noon  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.

**3D CAD with AutoDesk Inventor**
Entering Grades 5-9  $90
Saturday, February 6  9am-3pm  Class Capacity: 18

Three dimensional computer-aided design (3D CAD) is an essential skill for engineers and designers working with product design and development in many applications, including automotive, shipbuilding, and aerospace industries, industrial and architectural design, prosthetics, and many more. 3D CAD is also widely used to produce computer animation for special effects in movies, advertising and technical manuals. In this class, students will learn how to create their own 3D CAD models that convey not only design shapes but also information about materials, processes, dimensions, and tolerances. This class will introduce students with no 3D CAD experience to this exciting technology and add to the skills of students who have had some prior training in their school programs. AutoDesk is just one of many CAD software packages used by high schools (including the Project Lead The Way high school pre-engineering curriculum), colleges and universities, and businesses around the world.
<table>
<thead>
<tr>
<th>STEMming with Hanna &amp; Kristina: World of Biomedical Engineering Grades 3-5</th>
<th>$45</th>
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<tbody>
<tr>
<td>Saturday, February 13</td>
<td>9am-Noon</td>
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<td>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.</td>
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<table>
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<tr>
<th>Introduction to Animations with ALICE Grades 5-8</th>
<th>$45</th>
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<tr>
<td>Session 1: Saturday, February 20</td>
<td>9am-Noon</td>
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<td>Class Capacity: 18</td>
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<td>Note: This session is identical to Session 2 (offered in May.) Multiple sessions are offered to accommodate more students.</td>
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Alice' is an innovative 3D computer programming environment that makes it easy to create an animation for telling a story, an interactive game, or video to share. ALICE is designed to give students exposure to object-oriented programming. By manipulating objects in their virtual world, students gain experience with all programming constructs typically taught in an introductory computer engineering programming course. Students learn fundamental programming using 3D objects (e.g., people, animals, and vehicles) to populate a virtual world and create a program to animate the objects. ALICE allows students to drag and drop graphic tiles to create a program and see how their animation runs, easily understanding the relationship between programming statements and behavior of objects in their animation. No prior programming experience is required to participate in this course. Learn more about ALICE online at [www.alice.org](http://www.alice.org).

<table>
<thead>
<tr>
<th>STEMming with Hanna &amp; Kristina: Electricity &amp; Magnetism Grades 3-5</th>
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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 5-8, we offer “Exploring Electricity” later in the spring, which incorporates more advanced ideas and experiments.

<table>
<thead>
<tr>
<th>Advanced WeDo LEGO Robotics (Prior WeDo Experience Required) Grades 2-4</th>
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<tr>
<td>Saturday, March 5</td>
<td>9am-Noon</td>
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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.

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<tr>
<th>Animation &amp; Simulation Using Autodesk Inventor Grades 5-9</th>
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As a part of the 3D CAD process, engineers use the simulation and animation capabilities of CAD software when they begin testing their designs. In this class, students will learn how to use Autodesk Inventor to simulate the dynamics of a number of different mechanical assemblies and mechanical components, such as gears, dampeners, and belts. They will also learn how to apply representative forces to simulations and create animations videos. It is useful, but not required, for students to have previous experience with 3D CAD.

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<tr>
<th>How to Teach Yourself HTML &amp; CSS Entering Grades 8-adult</th>
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<tr>
<td>Saturday, March 12</td>
<td>9am-1:30pm</td>
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Just about everyone browses the internet on a daily basis. Wouldn’t it be great to go beyond browsing web pages and learn to create them? HTML is the primary language of web design, and CSS (Cascading Style Sheets) define how web pages look. Learning to use these tools seems like a daunting task, but with the wealth of online resources available, you can easily teach yourself how to make your own web pages. This class will explain the basics of HTML and CSS, give you a chance to design a sample web page, and show you all the information you need to continue developing web pages all on your own!
### STEMming with Hanna & Kristina: Environmental

**Saturday, March 12**

9am-Noon  
Class Capacity: 16  
Grades 3-5  
$45

In this class, students will examine the environment and learn how to preserve it, clean it, and make it a better place for all creatures. Students will engage in plenty of hands-on activities, including water analysis, investigating environmental cleanup, and discovering how plants can be used to positively affect our cities. We'll even take a peek at the green roof right here in Engineering Hall. This class will help students discover how environmental engineers use this information to provide a better living environment for society!

### STEMming with Hanna & Kristina: Fluids

**Saturday, April 2**  
9am-Noon  
Class Capacity: 16  
Grades 3-5  
$45

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 – Saturday, April 9**  
9am – Noon  
Class Capacity: 16  
Entering Grades 5-8  
$45

**Session 2 – Saturday, April 9**  
1pm – 4pm

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](http://mindstorms.lego.com).

### Exploring Electricity

**Saturday, April 9**  
9am-Noon  
Class Capacity: 16  
Entering Grades 5-8  
$45

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!

### Battle Bots: Design & Repair

**Saturday, April 16**  
9am-3pm  
Class Capacity: 15  
Grades 7-10  
$90

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 .. we want to use the Battle Bots for future classes as opposed to additions to a recycling bin.

### iHeels: GIRLS ONLY!

**Saturday, April 23**  
9am-Noon  
Class Capacity: 16  
Grades 6-8  
$45

Almost everything in our world has been touched in one way or another by an engineer. This iHeels (Inspiring Hands-on Engineering Experiences with Ladies of STEM) workshop will give young ladies a chance to experience the fun, challenge, and excitement of engineering. They will explore what engineers do and the many career paths a female engineer can take — paths you probably never even considered! Girls will work together to learn how engineers work to solve today’s problems through hands-on activities focused on the Engineering Design Process and may involve structures, electrical circuits, environmental impacts, computers, even the chemistry of making lotion! Female engineering instructors lead the group, and students will leave with more confidence in problem solving, design and analysis of solutions, and know that an engineering career can lead to amazing opportunities for women! This class will feature NEW activities so don’t worry if you have attended a previous iHeels class.
STEMming with Hanna & Kristina: Engineering & The Senses Grades 3-5  
Saturday, April 23  
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!

Take It Apart (Reverse Engineering)  
Grades 5-8  
Saturday, April 30  
9am-3pm  
Class Capacity: 15  
$90

Creative students often enjoy disassembling toasters, phones, and other household items. In this class students will get a chance to experience the fun of taking apart common every day products!! Reverse engineering is the process of discovering the principles of a human made device through analysis of its structure, function and operation. Students will study the design process to better understand how engineering problems are solved. If you are a “tinker” this class is for YOU.

Introduction to Animations with ALICE  
Grades 5-8  
Session 2: Saturday, May 7  
9am-Noon  
Class Capacity: 18  
$45

Note: This session is identical to Session 1 (offered in February.) Multiple sessions are offered to accommodate more students.

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To register for a Marquette Engineering Outreach Program, please visit:  
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

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