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

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

<table>
<thead>
<tr>
<th>Program</th>
<th>Grades</th>
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<td>3D CAD with AutoDesk Inventor</td>
<td>5-8</td>
<td>$90</td>
<td>Saturday, September 19</td>
<td>16</td>
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<tr>
<td>Design, Construction and Operation of BIG ROBOTS</td>
<td>7-10</td>
<td>$90</td>
<td>Saturday, September 26</td>
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<tr>
<td>Video Game Programming with ALICE</td>
<td>7-10</td>
<td>$90</td>
<td>Saturday, October 10</td>
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3D Computer Aided Design (3D CAD) is used by engineers to design most hardware systems from LEGO bricks to aircraft carriers. It is also used by students to design robots for competition events like the FIRST Robotics Competition. In this class, students will learn how to create 3D parts for an example toy using Autodesk Inventor. They will then learn how to assemble those parts and complete the toy design process.

This class is for students interested learning how to create big competition robots of the size used in FIRST Robotics Competitions. The class will start with discussion of going from a competition requirement to design ideas. These ideas will then be developed through 3D CAD and then extended to the mechanical, electrical and software systems needed to create a complete robot. During the class the students will work as teams to assemble, test and operate complete robots.

Prior Experience with ALICE required! Video games result from creating characters and action using software. The ‘Alice’ program provides all the ingredients for the implementation and testing of video game ideas. This class will introduce some of the basics of video games and describe the features of Alice that can be used for game implementation. Students will then use the illustrated techniques to modify games examples with their own ideas.
STEMming with Hanna & Kristina: “May the force be with you!”
Saturday, October 10
Grades 3-5 $45
9am-Noon
Class Capacity: 14

What is a force? Is it an invisible power that exists in Star Wars? Maybe, but it means so much more! A force is a push or pull acting upon an object as a result of its interaction with another object, and there are a variety of types of forces. Join us for hands on activities that will give you a better understanding of gravitational force and drag through an egg drop contest, and creation of different bandages. “May the force be with you!”

Android App Development Using AppInventer
Saturday, October 24
Grades 7-10 $90
9am-3pm
Class Capacity: 14

Smart phone and tablet apps are created by hundreds of thousands of people for fun, profit and the urge to create. Students in this class will learn the beginning steps of how they can join the ranks of ‘app creators’. The class is divided into three major topics. The first is a discussion of what is an ‘app’ and some approaches to creating an app worthy idea. The second topic is how the MIT/AppInventor graphical programming can be used to create apps for the Android operating system using Nexus 7 tablets. Finally, a number of example apps using the AppInventor language will be provided for testing and modification.

Learning JAVA using ALICE
Saturday, November 7
Grades 6-8 $90
9am-3pm
Class Capacity: 16

Prior Experience with ALICE required! Java is a universal language for programming computers. A billion plus programs written in Java are in use including many used for smart phone apps, appliances and industrial operations. In this class the basics of programming Java will be introduced using the Carnegie Mellon Alice Version 3 language (Note that while similar to Alice 2.4, Alice 3 is more general and designed to support the teaching of Java). The unique attributes of the Java language will be discussed and illustrated. Examples of how basic programming functions are created in Java will be provided and illustrated through student exercises. Finally, students will have the opportunity to create simple programs to implement their ideas.

STEMming with Hanna & Kristina: The World of Biomedical Engineering
Saturday, November 7
Grades 4-6 $45
9am-Noon
Class Capacity: 14

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.

Simple Machines
Saturday, November 14
Grades 2-4 $45
9am – Noon
Class Capacity: 16

In this class, students will develop an understanding of how familiar objects work through investigation and hands-on activities. Students will learn what makes simple machines work, how they make everyday tasks easier, and how engineers use these simple machines when making bigger machines. By playing with and manipulating models, they experience pulleys, levers, gears, and wheels and axles while exploring energy, buoyancy, and balance. Students will be given tools and tasks to promote scientific inquiry.
Exploring Electricity
Saturday, November 14
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 create their own batteries. The class will include several electrifying demonstrations and hands-on activities. Students will leave with a greater understanding of things they use every day!

Introduction to LEGO MINDSTORMS EV3 Robotics
Grades 5-8 $45
Session 1 – Saturday, November 14 9am-Noon Class Capacity: 16
Session 2 – Saturday, November 14 1-4 pm Class Capacity: 16
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.

WeDo LEGO Robotics
Grades 2-4 $45
Saturday, November 21 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.

STEMming with Hanna & Kristina: Exploring Newton’s Laws of Motion
Grades 4-6 $45
Saturday, December 5 9am-Noon Class Capacity: 16
When solid objects move through space, they follow certain rules that let us predict how they will act. The first three rules are known as Newton’s Law of Motion and they say that: First: An object in motion tends to remain in motion, and an object at rest tends to remain at rest. Second: Force equals mass time acceleration. Third: For every action there is an equal and opposite reaction. Students will test Newton’s Law of Motion as they create a balloon-powered boat, comet craters and verify these fundamental principles.

WeDo LEGO Robotics
Grades 2-4 $45
Saturday, December 5 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.