



ENGINEERING ACADEMIES FOR K-12 STUDENTS

OCTOBER 2010 – JANUARY 2011



MARQUETTE
UNIVERSITY

COLLEGE OF ENGINEERING



ENGINEERING IS FOR EVERYONE!

We encourage all students, regardless of age, race or gender, to study engineering and innovate.

The mission of the Engineering Outreach Program is to enhance the S.T.E.M. (science, technology, engineering, math) skills of children and adults and better prepare them for the challenges of competing in a global economy driven by innovation.

All engineering academies have limits on class size, and applicants will be enrolled on a first-come, first-served basis. The age ranges for each course are recommendations only.

For more information about our programs, visit marquette.edu/engineering or contact us at engineering@marquette.edu (Fun with Engineering) or (414) 288-6720.

ENGINEERING EDUCATION OUTREACH TEAM

Dr. Jon K. Jensen, Associate Dean,
College of Engineering

Molly Baker – BSME
Project Coordinator

Jack Samuelson, MS, Consultant and
Instructor for Engineering Outreach

Lori Stempski, Administrative Assistant

Ten New Academies

If you could use only one word to describe what engineers do, it would be design. Engineers design solutions to problems. Using the tools of science, technology, mathematics and art, engineers solve problems that are important to society, including controlling and preventing pollution, developing new medicines, creating advanced technologies, and even exploring new worlds. Using teamwork, imagination and skill, engineers are building a brighter future for everyone.

Through our programs, we hope to challenge our youth to become critical-thinking problem solvers and appreciate the engineering design process. We're in our sixth year and continue to develop and offer unique opportunities for students to have fun while solving real engineering problems. We also are pleased to announce 10 new academies for the first semester.

OCTOBER

Art in Science, Science in Art

NEW

October 23

10 a.m. – 3 p.m.

Ages 7–9

\$65

In this new course, students will learn the science behind these make-and-take art activities: the properties of plastics as you sculpt “pop” art desserts; the effects on the eye caused by op art pictures created in class; chromatography applied to the dying of hats; the physics of making spinning tops; the bending of light rays through hand-built polariscopes. Have fun mixing art and science.

Introduction to Robotics with the LEGO Mindstorms NXT

October 23

10 a.m. – 3 p.m.

Ages 10–16

\$60

Students will learn about the world of robotics by designing, building and programming the LEGO NXT robot, the latest generation of Mindstorms.

Puppy CAD

NEW

October 29-30 (GIRLS ONLY)

9 a.m. – 4 p.m.

Ages 12-16

\$120

This new course was developed to increase the participation of young women in STEM through hands-on activities. “Puppy CAD” computer-aided design integrates art and technology into the engineering design process. Participants will learn how to create 3-D models using Pro/ENGINEER software. Students will personalize their projects by learning display and animation techniques. The final product will be a movie of your creation! Sorry, NO BOYS!

Fun With Fluid Power: From Hydraulic Robotic Arms to Pneumatic Rockets **NEW**

October 29–30 10 a.m. – 3 p.m.
Ages 10–16 \$150

Fluid power, pneumatics and hydraulics are found everywhere, from squirt guns to the brakes in our vehicles. In this new program, students will build balloon-powered cars, pneumatic rockets, hydraulic lifting devices and three-axis robotic arms. It's guaranteed to be a gas (pun intended). Tuition includes take-home materials.

NOVEMBER

WATER — It's All About Energy **NEW**

November 13 10 a.m. – 3 p.m.
Ages 14–18 \$60

Nothing can live without it, but we take it for granted. Water has been called the new oil. Course activities include hands-on laboratory experiments in the Marquette Water Quality Center. Students will use water samples from rivers, lakes, streams, etc. and measure fundamental water quality parameters, such as the dissolved oxygen levels and various pollutant concentrations.

SUPER-CHARGED Mindstorms NXT **NEW**

November 13 9 a.m. – 4 p.m.
Ages 12–16 \$70

Learn how to use advanced functions available for the LEGO NXT. This class will include using Bluetooth for communication from a PC to the NXT, as well as communication between NXTs, methods of using more than four sensors per NXT, and using NXT data storage and data analysis. Examples of these functions will be programmed and applied to NXT-powered robots for autonomous and teleoperated action.

Engineering is a Family Affair

November 13 10 a.m. – 3 p.m.
Ages 6–12 \$90/pair

No experience is needed for this program that teams a parent, grandparent or aunt/uncle and a child together to experience the fun, challenge and excitement of engineering. Participants will perform hands-on problem-solving activities, including LEGO drag races, flight of the air rockets, fundamentals of electric circuits and the balsa bridge contest. Included is an electric circuits kit to continue experimenting at home.

The Greatest Bridge-building Class EVER! **NEW**

November 26 and 27 10 a.m. – 3 p.m.
Ages 10–16 \$170

Civil engineers design many different types of bridges: some bolted firmly in place and some that move. In this course, students will build and take home three different wooden bridge models that move: Strauss-Trunnion, Swing and Lift Bridges. They will also use computer-aided design to create their own stationary bridges, which will be built of wood and stress-tested until they break. Students should bring large boxes or bags to transport bridges — some will be more than two feet long! Tuition includes all materials.



DECEMBER

CAD Mechanisms and Animation **NEW**

December 4 9 a.m. – 4 p.m.
Ages 12–16 \$70

Using student-created and instructor-provided Pro/ENGINEER 3-dimensional computer-aided design models, the ProE Mechanisms and Animation applications will be used to add motion to the models and make movies of the models in action. Learn how 3D CAD can be used to create a rotating engine model and animate a dogfight between 3D models of airplanes.

Catching the Wind: Designing Windmills **cancelled**

December 11 10 a.m. – 3 p.m.
Ages 10–12 \$65

Discover how to capture the energy of wind as you follow the story of Lief and Dana, two kids from Denmark. Dana's new house has a fish pond outside, but the fish appear sick. Inspired by the wind turbines of Denmark, Lief and Dana realize they may be able to use wind energy to help solve the problem. Enlisting the help of Lief's mother, a mechanical engineer, Lief and Dana design a windmill to save the fish. Participants in this new course will create their own windmills and design blades to make their windmills spin. With some creativity and knowledge of the engineering design process, everyone can engineer! From the "Engineering is Elementary" program developed at the Museum of Science in Boston.

Introduction to Robotics with the LEGO Mindstorms RCX

December 11 10 a.m. – 3 p.m.
Ages 7–12 \$60

Students will be introduced to the world of robotics as they design, build and program the LEGO RCX robot, the most popular educational robot in history.

SUMO-bot Competition with the original Mindstorms, the RCX

December 27–29 9 a.m. – noon
Ages 8–11 \$90

Students will design, build and program robots to compete in a Sumo wrestling-style competition using the LEGO Mindstorms RCX system. This course is for beginners, as well as students with RCX experience.

SUPER SUMO-bot Competition with the Mindstorms NXT

December 27–29 1 p.m. – 4 p.m.
Ages 12–18 \$90

Using the LEGO Mindstorms NXT system, students will design, build and program robots to compete in a Sumo wrestling-style competition. This course is recommended for those experienced with the Mindstorms NXT.

JANUARY

Robotics In Action

January 22 and 29 9 a.m. – 4 p.m.
Ages 13–17 \$120

Learn how robots with two legs, four legs, six legs, wheels and tracks work. Learn how sensors are applied to create robotic action. Get hands-on experience with these robot types to learn something about their capabilities and limitations, as well as about the different software required to run them.

The Greatest Siege Machine Class Ever!

January 22 and 29 10 a.m. – 3 p.m.
Ages 10–16 \$190

Not one, not two, not three, but FOUR medieval siege machines will be built and tested in this new course: Seige Tower with catapult, Trebuchet Catapult, Torsion (Onager) Catapult and a catapult creation of Leonardo da Vinci that uses the tension stored in bent wood. Don't worry, parents, we'll use safe projectiles. Tuition includes take-home materials.



ENROLLMENT FORM — OCTOBER 2010 – JANUARY 2011

Name _____
Age _____ M F Phone _____
Parent or guardian _____
Address _____
City _____ State _____ ZIP _____
E-mail _____
Course title _____
Date(s) _____ Cost _____

Please submit your check, payable to **Marquette College of Engineering**, and enrollment form to:

Marquette University College of Engineering
Attn: Lori Stempksi
P.O. Box 1881
Milwaukee, WI 53201-1881

I agree to allow my child to participate in the Engineering Outreach Program at Marquette University. I assume the responsibility for the actions of my child. I will talk to my child about the importance of good, safe and cooperative behavior, as well as the virtues of being a good team player. Students who behave in an unsafe or uncooperative manner may be removed from the course without refund of fees. No refunds for missed classes. Students are enrolled on a first-come, first-served basis. Once an academy is full, applicants will be placed on a waiting list. At times, the media, instructors or associates of Marquette University may choose to report on course activities. As part of these reports, I will allow my son/daughter to be interviewed and/or photographed during supervised course activities.

Parent signature

College of Engineering
Haggerty Engineering, Room 210
P.O. Box 1881
Milwaukee, WI 53201-1881



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