IN-SCHOOL WORKSHOPS

SCIENCE, TECHNOLOGY, ENGINEERING & MATH WORKSHOPS FOR GRADES 3 TO 8

UNIVERSITY OF TORONTO | Engineering

IN-SCHOOL WORKSHOPS

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We link our workshops to Ontario curriculum expectations and are pleased to offer the following workshops to grade 3 to 8 classes. For pricing and booking instructions, please see the back cover. Each workshop can accommodate a maximum of 30 students and is offered at your school. Workshops for 2019 are offered between May 8 and June 14, 2019.

Our workshops are designed to be scalable for all grades from 3-8 and can be customized for different grades. Please contact us if you have a specific request.

UNDERSTANDING STRUCTURES & MECHANISMS

WORKSHOP TITLE	ACTIVITY DESCRIPTION	GRADE	TOPICS	ONTARIO CURRICULUM CONNECTION	UNIVERSITY DISCIPLINE CONNECTION
Hydraulic Hijinks (SM-1)	Students will design and construct a hydraulic crane as a working mechanical system.	Gr. 5	Technological problem-solving skills to design, build and test a structure and mechanical system that performs a specific function; the advantages and disadvantages of different types of mechanical systems	Understanding Structures and Mechanisms: Forces Acting on Structures and Mechanisms	**Mechanical Engineering**
		Gr. 7	Safety procedures for using tools and handling materials; physical models that investigate the effects of various forces on structures	Understanding Structures and Mechanisms: Form and Function	**Mechanical Engineering**
		Gr. 8	Technological problem-solving skills to investigate a system that performs a function; relationship between work, force and distance; mechanical advantage	Understanding Structures and Mechanisms: Systems in Action	**Mechanical Engineering**
Colossal Super-structures (SM-2)	Students will design, build and test structures that can withstand applied loads.	Gr. 3	Technological problem-solving skills and knowledge to design and build a strong and stable structure that serves a purpose	Understanding Structures and Mechanisms: Strong and Stable Structures	**Civil Engineering**
		Gr. 5	Factors that impact the strength of a structure and its ability to support and resist loads; materials and construction techniques that add strength and stability to structures; vocabulary, including compression, tension, strength and stability; problem-solving skills in designing, building and testing a strong structure that serves a purpose	Understanding Structures and Mechanisms: Forces Acting on Structures and Mechanisms	**Civil Engineering**
		Gr. 7	Factors that determine the ability of a structure to support a load; problem-solving skills that determine the most efficent way for a structure to support a given load	Understanding Structures and Mechanisms: Form and Function	**Civil Engineering**
Indy 500 (SM-3)	Students will design, build and test a model racecar.	Gr. 4	Investigations into rotary motion in one system or its components and how energy is transferred to another system or component in the same structure	Understanding Structures and Mechanisms: Pulleys and Gears	**Mechanical Engineering**
		Gr. 5	Technological problem-solving skills to design, build and test a structure; external forces acting on a structure; design, build and test integrating principles of aerodynamics; evolution and change in systems	Understanding Structures and Mechanisms: Forces Acting on Structures and Mechanisms	**Mechanical Engineering**
		Gr. 6	Applications of the properties of air; different forces (thrust, drag, lift, weight); design, build and test integrating principles of aerodynamics	Understanding Structures and Mechanisms: Flight	**Mechanical Engineering**

UNDERSTANDING LIFE SYSTEMS

WORKSHOP TITLE	ACTIVITY DESCRIPTION	GRADE	TOPICS	ONTARIO CURRICULUM CONNECTION	UNIVERSITY DISCIPLINE CONNECTION
Creature Creation (LS-1)	Students will design and construct a unique creature using principles of adaptation for survival in specific environments and ecosystems.	Gr. 3	Relationships in which plants and animals depend on each other (e.g., plants provide food for energy; animals help disperse pollen and seeds)	Understanding Life Systems: Understanding Basic Concepts	**Biology / Bioengineering**
		Gr. 4	Identification of factors (availability of water or food, amount of light, type of weather) that affect the ability of plants and animals to survive in a specific habitat	Understanding Life Systems: Habitats and Communities	**Biology / Bioengineering**
		Gr. 6	Characteristics of organisms; classification systems; biodiversity and its role in maintaining the resilience of species	Understanding Life Systems: Biodiversity	**Biology / Bioengineering**
Gene Machine (LS-2)	Students will extract DNA from plant cells through chemical processes and explore the structure and importance of cells.	Gr. 5	Building models to demonstrate how organs or components of body systems in organisms work and interact with other components	Understanding Life Systems: Developing Investigation and Communication Skills	**Biology / Bioengineering**
		Gr. 6	Distinguishing characteristics of plants and animals; role of biodiversity; cell theory; DNA; principles of heredity	Understanding Life Systems: Biodiversity	**Biology / Bioengineering**
		Gr. 7	Cell theory; structures and organelles in cells; characteristics, structure and function of plant and animal cells; DNA; principles of heredity	Understanding Life Systems: Cells	**Biology / Bioengineering**
Forensic Fun (LS-3)	Students will use knowledge of chemical interactions to solve a mystery.	Gr. 5	Assess the effects of social and environmental factors on human health, and propose ways in which individuals can reduce the harmful effects of these factors	Understanding Life Systems: Relating Science and Technology to Society and the Environment	**Chemistry / Chemical Engineering**
		Gr. 6	Following established safety procedures for outdoor activities and field work	Understanding Life Systems: Developing Investigation and Communication Skills	**Chemistry / Chemical Engineering**
		Gr. 7	Human activities and technologies that alter balances and interactions in the environment	Understanding Life Systems: Interactions in the Environment	**Chemistry / Chemical Engineering**

UNDERSTANDING MATTER & ENERGY

WORKSHOP TITLE	ACTIVITY DESCRIPTION	GRADE	TOPICS	ONTARIO CURRICULUM CONNECTION	UNIVERSITY DISCIPLINE CONNECTION
Alarm Systems (ME-1)	Students will create working alarm systems using circuit components.	Gr. 3	Safety procedures during science and technology investigations; effects of increasing or decreasing amounts of force or energy applied to an object	Understanding Matter and Energy: Developing Investigation and Communication Skills	**Electrical Engineering**
		Gr. 4	Development of technological problem-solving skills to design, build and test a device that makes use of the properties of light or sound	Understanding Matter and Energy: Light and Sound	**Electrical Engineering**
		Gr. 6	Series and parallel circuits; circuit components; design, build and test an alarm system that transforms electrical energy into another form of energy to perform a function; conductors and insulators of electricity	Understanding Matter and Energy: Electricity and Electrical Devices	**Electrical Engineering**
Circut Mazes (ME-2)	Students will explore the concept of closed circuits as they design and create a circuit maze system.	Gr. 3	Safety procedures during science and technology investigations; effects of increasing or decreasing amount of force or energy applied to an object	Understanding Matter and Energy: Developing Investigation and Communication Skills	**Electrical Engineering**
		Gr. 4	Technological problem-solving skills to design, build, and test a device that makes use of the properties of light or sound	Understanding Matter and Energy: Light and Sound	**Electrical Engineering**
		Gr. 6	Designing and building series and parallel circuits, drawing labelled diagrams, identifying the components used in each, and describing the role of each component in a circuit	Understanding Matter and Energy: Electricity and Electrical Devices	**Electrical Engineering**
Slime & Polymers (ME-3)	Students will formulate and synthesize polymer creations.	Gr. 3	The effects of the action of forces in nature on the natural and built environment, and identification of ways in which human activities can reduce or enhance this impact	Understanding Matter and Energy: Relating Science and Technology to Society and the Environment	**Chemistry / Chemical Engineering**
		Gr. 5	Physical properties of materials and their applications; properties of solids, liquids and gases; physical and chemical changes	Understanding Matter and Energy: Properties and Changes in Matter	**Chemistry / Chemical Engineering**
		Gr. 7	Properties of pure substances and mixtures; particle theory of matter; experimentation skills to investigate the properties of mixtures and solutions; concentration of solutions in qualitative and quantitative terms	Understanding Matter and Energy: Pure Substances and Mixtures	**Chemistry / Chemical Engineering**

UNDERSTANDING SPACE & EARTH SYSTEMS

WORKSHOP TITLE	ACTIVITY DESCRIPTION	GRADE	TOPICS	ONTARIO CURRICULUM CONNECTION	UNIVERSITY DISCIPLINE CONNECTION
Extreme Roller-Coasters (SE-1)	Students will design, build and test model roller-coasters, while applying laws of physics and principles of design.	Gr. 4	Social and environmental costs and benefits of using objects in the built environment that are made from rocks and minerals	Understanding Earth and Space Systems: Rocks and Minerals	**Mechanical Engineering**
		Gr. 5	Technological problem-solving skills to design, build and test a device that transforms one type of energy into another; Law of Conservation of Energy	Understanding Earth and Space Systems: Conservation of Energy and Resources	**Mechanical Engineering**
		Gr. 7	Environmental and economic impacts of using conventional and alternative forms of energy	Understanding Matter and Energy: Relating Science and Technology to Society and the Environment	**Mechanical Engineering**

UNDERSTANDING SPACE & EARTH SYSTEMS (CONT.)

WORKSHOP TITLE	ACTIVITY DESCRIPTION	GRADE	TOPICS	ONTARIO CURRICULUM CONNECTION	UNIVERSITY DISCIPLINE CONNECTION
Rocket Science! (SE-2)	Students will build and test rockets to investigate the principles of aerodynamics.	Gr. 4	Social and environmental costs and benefits of using objects in the built environment that are made from rocks and minerals	Understanding Earth and Space Systems: Rocks and Minerals	**Aerospace Engineering**
		Gr. 6	Components of the solar system; technological tools and devices needed for space exploration; physics of flight and forces acting on an object in flight	Understanding Earth and Space Systems: Space	**Aerospace Engineering**
		Gr. 7	Social and environmental benefits of technologies that reduce heat loss or transfer; environmental and economic impacts of using conventional and alternative forms of energy	Understanding Earth and Space Systems: Heat in the Environment	**Aerospace Engineering**
Crazy Catapults (SE-3)	Students will explore how force and energy affect motion by designing and building catapult mechanisms.	Gr. 4	Social and environmental costs and benefits of using objects in the built environment that are made from rocks and minerals	Understanding Earth and Space Systems: Rocks and Minerals	**Mechanical Engineering**
		Gr. 5	Technological problem-solving skills to design, build and test a device that transforms one type of energy into another; Law of Conservation of Energy	Understanding Earth and Space Systems: Conservation of Energy and Resources	**Mechanical Engineering**
		Gr. 7	Environmental and economic impacts of using conventional and alternative forms of energy	Understanding Earth and Space Systems: Relating Science and Technology to Society and the Environment	**Mechanical Engineering**

FULL DAY WORKSHOPS

WORKSHOP TITLE	ACTIVITY DESCRIPTION	GRADE	TOPICS	ONTARIO CURRICULUM CONNECTION	UNIVERSITY DISCIPLINE CONNECTION
A.I. Bots (FD-1)	Students will learn about robotics and fundamental coding and problem solving skills.	Gr. 4	Technological problem-solving skills to design, build, and test a device that makes use of properties of light or sound	Understanding Matter and Energy: Light and Sound	**Robotics / Computer Science**
		Gr. 6	Technological problem-solving skills to design, build and test a device that transforms electrical energy into another form of energy in order to perform a function	Understanding Matter and Energy: Electricity and Electrical Devices	**Robotics / Computer Science**
		Gr. 7	Evaluation of the importance for individuals, society, the economy, and the environment of factors that should be considered in designing and building structures and devices to meet specific needs	Understanding Structures and Mechanisms: Form and Function	**Robotics / Computer Science**
Sustainable Urban Planning (FD-2)	Students will work to plan an eco-city of the future with consideration of environmental impact and energy conservation.	Gr. 4	Positive and negative impacts of human interactions with natural habitats and communities, taking different perspectives into account, and evaluations of ways of minimizing the negative impacts	Understanding Life Systems: Habitats and Communities	**Civil Engineering / Industrial Engineering**
		Gr. 5	Scientific inquiry/research skills to investigate issues related to energy and resource conservation; effects of various technologies on energy consumption	Understanding Earth and Space Systems: Conservation of Energy and Resources	**Civil Engineering / Industrial Engineering**
		Gr. 7	Assess the impact of selected technologies on the environment; costs and benefits of selected strategies for protecting the environment	Understanding Life Systems: Interactions in the Environment	**Civil Engineering / Industrial Engineering**

LEADERSHIP WORKSHOPS

SCIENCE, TECHNOLOGY, ENGINEERING & MATH WORKSHOPS FOR GRADES 3 TO 8

WORKSHOP TITLE	ACTIVITY DESCRIPTION	GRADE	TOPICS	ONTARIO CURRICULUM CONNECTION	STEM CONNECTION
Extreme Roller Coaster Design Challenge	Students will work in teams to design, build, and test model roller coasters in a rapid prototyping session, while applying laws of physics, principles of design, budgetary considerations and client specifications.	Gr. 5	Technological problem-solving skills to design, build and test a device that transforms one type of energy into another; Law of Conservation of Energy; Designing with varying client specifications in mind	Understanding Earth and Space Systems: Conservation of Energy and Resources	**Mechanical Engineering**
		Gr. 8	Technological problem-solving skills to design, build, and test a device according to client specifications; examination of the effects of various components of the system and how they affect its function and output	Understanding Structures and Mechanisms: Systems in Action	**Mechanical Engineering**
No Bones About it	Students will examine how components of the human skeleton come together to allow us to function in the ways we do. They will then look to comparative anatomy to learn more about living organisms and their environment as inspiration for innovation.	Gr. 5	Investigating how the skeletal system works with other systems in the body to help us function the way we do; using bio-inspired design in engineering to help improve lives for those with injury or disease; exploring comparable systems in other living things	Understanding Life Systems: Human Organ Systems	**Biomedical Engineering, Materials Science**
		Gr. 7	Investigating the factors and structures that allow the body to do the things it does; Biomimicry and bio-inspired design in engineering to help improve lives of those with injury or disease; exploring comparable skeletal structures of other living things	Understanding Structures and Mechanisms: Form and Function	**Computer/ Environmental Engineering**
Emergency Shelters	Students will create shelters for an emergency situation while testing their communication, teamwork and collaboration skills. Structures will be tested for stability and efficiency of their design in context. Students will work together to resolve challenges and explore priorities in a time of crisis.	Gr. 3	Factors that impact the strength and stability of a structure; problem-solving skills in designing, building and testing a strong and stable structure that serves a purpose; forming a collaborative and mutually beneficial set of community standards	Understanding Structures and Mechanisms: Strong and Stable Structures	**Civil Engineering**
		Gr. 5	Internal forces acting on a structure (compression, tension); external forces (wind, movement); building a stable structure to support a load; how structures are built to withstand forces; the role of citizens in a community; taking a leadership role in a time of crisis; working as a team; effective communication and the various forms it can take	Understanding Structures and Mechanisms: Forces Acting on Structures and Mechanisms; Social Studies: The Role of Government and Responsible Citizenship	**Civil Engineering**
		Gr. 7	Investigating the relationship between the design and function of various structures; factors that need to be considered in structure design; effective communication and teamwork in a time of crisis	Understanding Structures and Mechanisms: Form and Function	**Civil Engineering**
Toy Design	Students will look at the engineering design and innovation process on a smaller scale, examining all of the detailed decisions that must be made along the way and how they impact a final product.	Gr. 5	Examining forces acting on a mechanism to inform the design of an improved mechanism; rapid prototyping and the engineering design cycle; importance of giving and receiving constructive feedback as a leader in science and engineering; the engineering design process	Understanding Structures and Mechanisms: Forces Acting on Structures and Mechanisms	**Mechanical Engineering**
		Gr. 7	Investigating the relationship between the design and function of a mechanism and the forces that act upon it; rapid prototyping and the engineering design cycle; importance of giving and receiving constructive feedback	Understanding Structures and Mechanisms: Form and Function	**Industrial Engineering (Human Factors)**

CODING WORKSHOPS
FOR GRADES 3 TO 8

*Plugged Coding Workshops are only offered at the University of Toronto St. George Campus, or at schools that meet the technology and software requirements.

To make arrangements to book a workshop, please contact us for details.

WORKSHOP TITLE	ACTIVITY DESCRIPTION	GRADE	TOPICS	ONTARIO CURRICULUM CONNECTION	UNIVERSITY DISCIPLINE CONNECTION
Urban Planning with Augmented Reality (Plugged*)	Students will design functional and accessible cities, and learn to use Augmented Reality software 'Unity' to create 3D projections from their layouts and bring their cities to life.	Gr. 5 Gr. 6	Factors of terrain and habitat interacting with urban development; importance and benefits of urban planning both on a micro and macro scale.	People and Environments: Living and Working in Ontario	**Civil / Computer Engineering**
		Gr. 7 Gr. 8	Displaying and viewing virtual objects in augmented reality and computer vision targeting; digital manipulation of 3D objects.	Geometry and Spatial Sense	**Computer Engineering**
App Development: Design for User Experience (Plugged*)	Students will create their own unique Android app using MIT App Inventor while learning about different elements of designing an application.	Gr. 3 Gr. 4	Definitions and understanding of key terms (ex) app, procedure, computer science.	Reading Comprehension, Listening Skills	**Computer Engineering**
		Gr. 5 Gr. 6	User Experience and the critical analysis and creation of apps.	Disciplinary / Critical Thinking, Media Arts	**Industrial Engineering (Human Factors)**
		Gr. 7 Gr. 8	Proper coding practices and use of flowcharts or other graphical organizers as a planning tool.	Cause and Consequence, Continuity and Change	**Computer/Environmental Engineering**
Introduction to Programming (Plugged*)	Students will learn about programming, logical thinking and engineering methodologies to code their own programs using Scratch.	Gr. 3 Gr. 4	Definitions and understanding of key terms (ex) app, procedure, computer science.	Cause and Consequence, Continuity and Change	**Computer/Environmental Engineering**
		Gr. 5 Gr. 6	Proper coding practices and use of flowcharts or other graphical organizers as a planning tool.	Data Management	**Computer Engineering, Applied Mathematics**
Think like an Engineer: Problem Solving (Unplugged)	Students will learn to use professional techniques used by engineers and computer scientists to solve, organize and strategize complex problems by applying them to different scenarios and fun games.	Gr. 3 Gr. 4	Differences and similarities in the manner in which computers and humans process data and its application to algorithm development; diagrammatic representation of code in the form of flowcharts and blocks as a planning and organizational tool.	Reading Comprehension, Geometry and Spatial Sense	**Computer Engineering**
Coding and Computational Thinking (Unplugged)	Students will develop a mindset of a programmer by learning about the inner workings of a computer, good coding practices and different algorithms by applying them to their daily routines.	Gr. 3 Gr. 4	The three types of errors that exist in computer programming and strategic debugging methods; diagrammatic representation of code in the form of flowcharts and blocks as a planning and organizational tool.	Data Management and Probability	**Computer Engineering**

IN-SCHOOL WORKSHOPS 2019 BOOKING FORM

For online registration, please visit **www.uoft.me/isw**

CONTACT INFORMATION

MAIN CONTACT:

FIRST NAME ..... LAST NAME .....

PHONE NUMBER ..... EMAIL ADDRESS .....

SCHOOL:

SCHOOL NAME ..... BOARD .....

ADDRESS:

STREET NO. & NAME ..... CITY ..... POSTAL CODE .....

NEAREST INTERSECTION TO SCHOOL .....

PHONE:

PHONE ..... EXTENSION .....

WE OFFER IN-SCHOOL WORKSHOPS ON THE FOLLOWING DATES: MONDAY TO FRIDAY FROM MAY 8 TO JUNE 14, 2019.

To schedule workshops outside the May 8 to June 14 window, please email your preferred dates to **workshop@ecf.utoronto.ca** to check availability before submitting this form.

Which dates would you prefer us to visit your school?

REQUESTED DATE: ..... ALTERNATIVE DATE: .....

To help us schedule your workshops, please provide your school schedule:

START: ..... LUNCH: ..... END: .....

WORKSHOP REQUESTS

Please note: Each workshop can accommodate a maximum of 30 students and is offered at your school. Please email us at **workshop@ecf.utoronto.ca** for more information.

TEACHER	GRADE	# OF STUDENTS	WORKSHOP TITLE	START TIME	END TIME
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

If you are not booking online, please email or mail this form to us. After we receive your form, we will send you a confirmation and invoice to the email address provided. Workshops are not officially booked until you receive confirmation. We look forward to hearing from you!

CONTACT IN-SCHOOL WORKSHOPS

In-School Workshops, University of Toronto 35 St. George Street, Room 173, Toronto ON M5S 1A4 Canada

Email: **workshop@ecf.utoronto.ca** | Online registration: **www.uoft.me/isw** | Tel: **416-946-0816**

HOW TO BOOK AN IN-SCHOOL WORKSHOP

1. **Select your workshops.** We offer a wide range of workshop topics that are grade-specific, fun and kid-friendly. Each half-day workshop is 2.5 hours in length, while full-day workshops are 5 hours in length. We are pleased to offer special pricing on workshop packages for schools. If other teachers in your school are interested in booking workshops, we encourage you to book together to save money. Please note, each workshop can accommodate a maximum of 30 students.
2. **Complete the booking form.** We schedule workshops on a first-come-first-served basis. Book early for preferred dates!
3. **Send your completed form to our office by mail:**

BY EMAIL: workshop@ecf.utoronto.ca **DOWNLOAD THE FORM:** **www.uoft.me/isw**

The University of Toronto's Faculty of Applied Science & Engineering is committed to inspiring young minds in the areas of science, technology, engineering and math (STEM). We achieve this through a wide range of year-round, hands-on programs for children of all ages. Last year, we reached more than 5,000 pre-university youth. Some of our programs include:

JR. DEEP (SUMMER, GR. 3–8)

GIRLS' JR. DEEP (SUMMER, GR. 3–8)

JR. DEEP SATURDAYS (FALL AND WINTER, GR. 3–8)

GIRLS' JR. DEEP SATURDAYS (FALL AND WINTER, GR. 3–8)

DEEP SUMMER ACADEMY (SUMMER, GR. 9–12)

DEEP LEADERSHIP CAMP (SUMMER, GR. 10–12)

After you receive your confirmation, leave the rest to us!

Our instructors will bring the necessary materials for all activities.

UNIVERSITY OF TORONTO | Engineering

ENGINEERING OUTREACH OFFICE, UNIVERSITY OF TORONTO
35 St. George Street, Room 173, Toronto, ON M5S 1A4 Canada
Email: workshop@ecf.utoronto.ca | **www.outreach.engineering.utoronto.ca**
Tel: 416-946-0816

WORKSHOP PACKAGES & PRICING

Booking In-School Workshops with other teachers in your school is the most cost-effective way to bring these enriching workshops to your classroom. Packages can be split among different grade levels and classrooms (maximum 30 students per workshop) within your school, but all workshops must occur on the same day.

SCHOOL PACKAGE I: FULL-DAY **$1,560**
12 workshops @ 2.5 hrs each

SCHOOL PACKAGE II: HALF-DAY **$875**
6 workshops @ 2.5 hrs each

INDIVIDUAL WORKSHOPS
1 workshop @ 2.5 hrs each **$170**
1 workshop @ 5 hrs (full day) **$310**

Priority will be given to schools with multiple bookings.

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Youth · STEM · Innovation

Actua provides training, resources and support to its national network of members located at universities and colleges across Canada in the delivery of science, technology, engineering and mathematics (STEM) education outreach programming. Each year, these members engage over 225,000 youth in 500 communities nationwide. Please visit Actua at **www.actua.ca**.