Engineering Science Quest
UNIVERSITY OF WATERLOO

ELEMENTARY SCHOOL
STEM NIGHT

INVESTIGATE / INSPIRE / LEARN / INVENT / WONDER

ENGINEERING OUTREACH

UNIVERSITY OF
WATERLOO

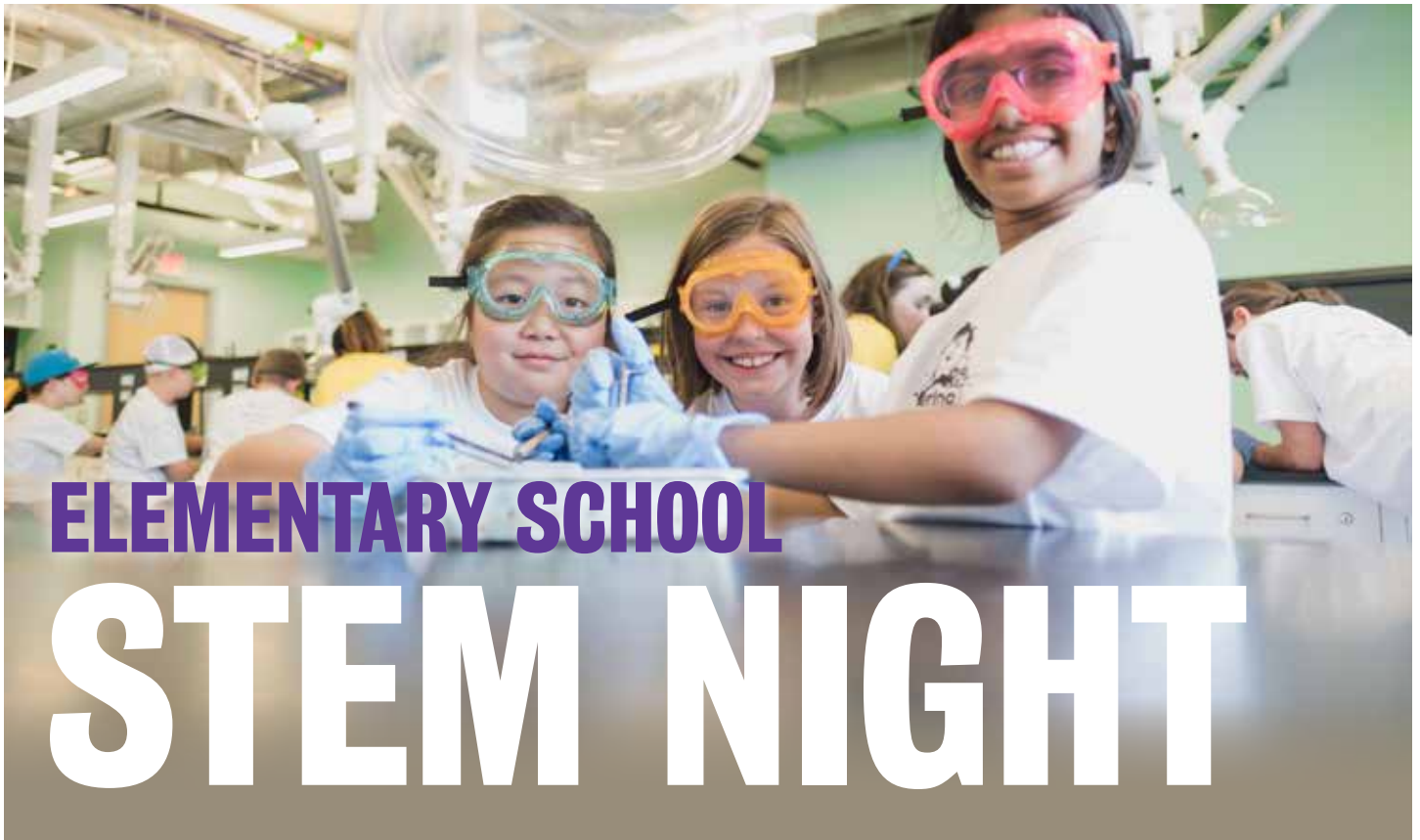# ELEMENTARY SCHOOL
STEM NIGHT

Designed for the Parents Reaching Out (PRO) grant (though not exclusively) offered for schools, this event is meant to help parents and their children engage with Science, Technology, Engineering and Mathematics (STEM).

This is achieved through classroom activities and larger drop-in activities in the school gymnasium. All activities are hands-on and interactive as well as being based on the Ontario Science and Technology Curriculum. There are two categories of activities for you to select from: Design & Build and Technology.

Each in-classroom activity takes approximately 20-30 minutes to complete. Parents and children can then choose to attend different sessions during their time at the event, with handouts to continue hands-on learning at home!

BOOKING OVERVIEW

1. Send an email to **esqinfo@uwaterloo.ca** inquiring about booking dates (we only book PROs on Thursdays)

2. Once you have a date confirmed, you will book a meeting with an ESQ staff

3. From the information below select your activities

4. Have the meeting to go over logistics

5. Run the event!

ESQ STAFF

In order to ensure that every activity is running properly, and to assist students and parents, ESQ provides a trained staff member for each workshop activity, and a minimum of 2 trained staff members for the gymnasium activities. These staff serve as a resource for when help is needed. Parents and children are encouraged to use the handout available to explore and learn by themselves!

IN-CLASSROOM ACTIVITIES

You will select 5 or 6 activities in total; 2-3 from the Technology category and 2-3 from the Design & Build category. If you are expecting under 100 students, select 5 activities; if you are expecting over 100 students then select 6 activities. Some activities have requirements of the space they are run in, these requirements are listed with the activity descriptions below.

Each activity needs its own classroom space, ideally with a full class set of tables and chairs so that students can work at them.

DESIGN & BUILD	TECHNOLOGY
Crash Cars	Osmo Coding
Chariot Races	Makey Makey
Gliders Galore	Sphero Maze
Terrific Towers	Snap Circuits
Pinhole Viewer	Scratch

DESIGN AND BUILD ACTIVITY DESCRIPTIONS

CRASH CARS
Students will be challenged to build a car that can protect a water balloon (the passenger) from the impact of a crash at the end of a ramp.

ROOM REQUIREMENT: An exposed wall that the ramp can be put against and tarp can be put up to collect any burst water balloons.

CHARIOT RACES
Students will build a chariot that can carry cargo from one location to another. The chariot will get its power from a Sphero (controlled by ESQ staff).

GLIDERS GALORE
Students try different models of gliders to see which design makes them go fastest, farthest, slowest, etc.!

ROOM REQUIREMENT: Large open space within the classroom so that gliders can be flown or easy access to a low traffic hallway.

TERRIFIC TOWERS
Students will use straws and connectors to complete various building challenges.

PINHOLE LIGHT
Students will make a pinhole viewer to make different colour patterns from red, green and blue LED lights while learning about how we see colour.

TECHNOLOGY ACTIVITY DESCRIPTIONS

OSMO CODING
While practicing the logic thinking that goes with computer coding students will make music or help Awbie navigate the forest looking for strawberries.

MAKEY MAKEY
Using the concepts of electricity flowing through circuits students will connect everyday objects and use them in place of the arrow keys, spacebar and left click of the mouse.

SPHERO MAZE
Students will code Sphero through a maze, change its colour and play sounds.

ROOM REQUIREMENT: A minimum 5' x 5' space for the maze to be placed for use. Kindergarten rooms are usually ideal for this activity.

SNAP CIRCUITS
Make a circuit using components that snap together. There is an instruction book with 100s of projects or make your own.

SCRATCH
Use block coding to make to bring a character to life in a short animations.

GYMNASIUM ACTIVITIES

These activities are included in the cost of the PRO and require no selection on your end. This means that we will need the gymnasium for the event. They are for all ages and will likely be the following:

> LEAP Motion: a device that tracks the movements of your hands and fingers and uses it as a game controller

> Virtual Reality: using the Google Cardboard and smartphones, students will get to experience virtual worlds

> Air Vortex Cannon: a device designed to release rings of air in the shape of a doughnut
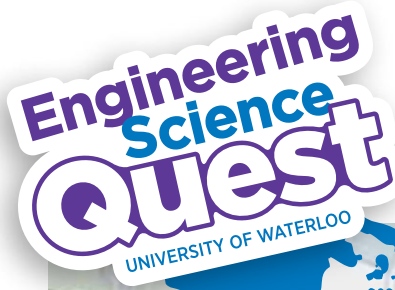
BEFORE THE EVENT

In order to ensure that the event runs safely and efficiently and that all spaces are appropriate for each activity, the ESQ management team will set up a meeting with a school representative at their convenience to tour the school area prior to the event.

YOU WILL NEED THE FOLLOWING READY AND AVAILABLE FOR THE MEETING:

› School population

› Expected (approximate) attendance

› What should be done with the garbage and recycling at the end of the event?
Note: we will handle all setup and clean-up of the event.

› A map of the school (this will be used to label our material bins and help ESQ staff find the rooms being used on the day of the event)

› Rooms in mind that will be appropriate to use for the night of

COST AND PAYMENT

As ESQ is a not for profit organization, we would need to ensure the essential costs of running an event such as this are covered. ESQ's costs would include travel, staff and materials. A standard 30 student one hour workshop costs $60.00 per class. However for all of the above ESQ expects an approximate cost of $900.00.

Please have a cheque payable to "University of Waterloo" for the amount of $900.00 ready for us on the day of the event. If that is not possible please let us know and send a cheque via mail to:

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WATERLOO ENGINEERING OUTREACH PROGRAMS

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