Connections
QUEEN'S ENGINEERING EXPERIENCE PROGRAM

Queen's UNIVERSITY | FACULTY OF ENGINEERING AND APPLIED SCIENCE

Queen's Summer Engineering Academy Online: Intermediate/Senior

CURIOSITY CREATES

A BRIGHT FUTURE

For more information, check out our website:
queensconnections.ca

About the program

Connections Engineering Outreach

Connections Engineering Outreach was established in March of 2014, and is an engineering-focused educational outreach program run through the Faculty of Engineering and Applied Science (FEAS). Connections manages/facilitates educational Science, Technology, Engineering, and Math (STEM) outreach programs in the greater Kingston area and beyond. The STEM outreach activities supported by Connections are targeted at specific audiences such as K-12 students and underrepresented and minority groups in the engineering profession. Connections also facilitates a number of programs focused on building educator capacity to integrate STEM concepts into the classroom.

Connections' mission is to educate, inspire, and raise the profile of the engineering profession and related STEM careers among pre-university students, educators, parents, and the public. More specifically, Connections' goals are to:

1. Provide experiential opportunities for K-12 students to learn about STEM concepts related to engineering, with additional focus on increasing diversity related to engineering.
2. Provide professional development opportunities and educational resources (aligned with STEM curriculum) to help educators integrate STEM principles into their practice.
3. Develop positive relationships with the FEAS and the Kingston community.

Queen's Summer Engineering Academy (QSEA)

In 2016, Connections launched the Queen's Summer Engineering Academy, which is an engineering-focused summer program that exposes students to engineering design and a variety of engineering disciplines. The students participate in hands-on experiences within the various research/lab facilities and the instructors use thought-provoking engineering projects and labs to inform and engage students. The 2016 QSEA program was offered for four weeks to senior students in grades 9-11 (ages 14-17) and expanded in 2017 by introducing the QSEA Intermediate program to students in grades 7-8 (ages 12-13). Over the years, the Faculty of Engineering and Applied Science at Queen's has continued its excellence in research and teaching and learning. It has also increased the number of engineering streams within engineering disciplines. QSEA 2021 will include our first ever QSEA Girls programs.

QSEAO Intermediate
(Currently in Grades 7-8):

The Engineering Experience A & B

Course Description: In the Engineering Experience A & B, students will be introduced to the main engineering disciplines offered at Queen's University. Using their previous knowledge of math and science, participants will asynchronously tackle open ended design problems, requiring abstract and technical thinking to showcase the Engineering Design Process.

Through a series of daily activities, each course offers students the opportunity to learn basic engineering principles and skills such as planning/designing, modeling, communication and computer programming. These activities will include, but are not limited to: Elastic Powered Cars, Intro to Micro:bits and Breadboarding with TinkerCAD. Daily synchronous touch points with current Queen's undergraduate students offer the opportunity to answer any questions that may arise throughout the week.

In addition to designing and creating various projects, participants will be exposed to a variety of educational technologies including: Microcontrollers (micro:bits), CoSpaces, Artificial Intelligence (machine learning), TinkerCAD & various coding languages (block, python). The Engineering Experience A & B will lay the foundation for generations of engineers to come!

Sessional Dates:

Course A	Course B
July 12-16, 2021	July 5-9, 2021
July 26-30, 2021	July 19-23,2021
August 16-20, 2021	August 9-13, 2021

Sample Course Schedule

*Please note that this is only a sample and is subject to change!

Day/Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:00am - 9:30am	Introduction to QSEAO - **Synchornous Learning**	Micro:bit Cryptography (Computer Engineering)-**Asynchornous Learning**	Mousetrap Car (Mechanical Engineering) - **Asynchornous Learning**	Emotion Sensing with AI (Mechatronics Engineering) - **Asynchornous Learning**	Queen's Engineering Past, Present and Future Discussion - **Synchornous** Learning
9:30am - 10:00am					
10:00am - 10:30am	Earthquake Resistant Structures (Civil Engineering) -**Asynchornous Learning**				
10:30am - 11:00am					
11:00am - 11:30am					
11:30am - 12:00pm					
12:00pm - 1:00pm	Lunch				
1:00pm - 1:30pm	Earthquake Resistant Structures (Civil Engineering) -**Asynchornous Learning**	Micro:bit Cryptography (Computer Engineering)-**Asynchornous Learning**	Mousetrap Car (Mechanical Engineering) - **Asynchornous Learning**	Emotion Sensing with AI (Mechatronics Engineering) - **Asynchornous Learning**	
1:30pm - 2:00pm					
2:00pm - 2:30pm					
2:30pm - 3:00pm					
3:00pm - 3:30pm	Daily Touch Point (Question and Answer Period) - **Synchornous Learning**	Daily Touch Point (Question and Answer Period) - **Synchornous Learning**	Daily Touch Point (Question and Answer Period) - **Synchornous Learning**	Daily Touch Point (Question and Answer Period) - **Synchornous Learning**	
3:30pm - 4:00pm					

QSEAO Senior
(Currently in Grades 9-11):

Engineering at Queen's A & B

Course Description: Engineering at Queen's A & B, will see students introduced to the core engineering disciplines offered at Queen's University, while also exploring life as an engineering student. Students will asynchronously apply the fundamentals of math and science to open ended design problems, requiring abstract and technical thinking to explore the Engineering Design Process and the engineering professions.

Through a series of daily activities, each course offers students the opportunity to learn engineering principles and skills such as design, drafting, modeling and computer programming, along with the opportunity to strengthen professional skills such as asynchronous learning and communication. These activities will include, but are not limited to: Mousetrap Cars, Micro:bit Cryptography and Sensing Emotion using AI. Daily synchronous touch points with current Queen's undergraduate students offer the opportunity to answer any questions that may arise throughout the week.

In addition to designing and creating various projects, participants will be exposed to a variety of educational technologies including: Microcontrollers (Micro:bits), CoSpaces, Artificial Intelligence (machine learning) & other engineering design software programs used by Queen's engineering undergraduate students. Engineering at Queen's A & B will showcase the diverse field that is engineering!

Sessional Dates:

Course A	Course B
July 5-9, 2021	July 12-16, 2021
July 19-23, 2021	July 26-30,2021
August 9-13, 2021	August 16-20, 2021

Additional Information

Cost: Due to the generosity of our major funder ACTUA, Connections is happy to announce all QSEAO Intermediate and Senior courses will be offered for **FREE!** A $100 deposit will be required at registration and refunded at course conclusion provided participant attendance.

Materials: While many activities will require the use of everyday household items, all course participants will also receive a QSEAO Course Package. These packages will include: activity specific materials, a Micro:bit, QSEAO swag and much more!

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QSEA Girls 2021 Course Descriptions

This program presents students with an overview of engineering using age-appropriate, and thought provoking projects to inform and engage students without being technically overwhelming. Participants will work with female instructors as they participate in activities, promote collaboratoin, leadership, communication, creativity, and critical thinking.

These programs are currently scheduled to run in-person on Queen's campus. Connections Engineering Outreach continues to monitor the COVID-19 situation and will adhere to all public health guidelines. These programs are subject to cancellation.

Introduction to Engineering (Currently in Grades 1 and 2)

Course Description: This session will introduce participants to engineering through fun, hands-on learning opportunities that connect to the Ontario curriculum.

This course has been planned to introduce young girls to the wonderful world of STEM! Activities have been designed to engage students while remaining age-appropriate.

There are two stand-alone sessions of this course - feel free to join us for one or both!

Sessional Dates:
July 5 - 9, 2021
August 16 - 20, 2021

Engineering our Environment (Currently in Grades 3 and 4)

Course Description: This session will be taking a look at the variety of engineering disciplines from an environmental lens.

Participants will be guided through a variety of hands-on engineering activities and how to code using the 3D/virtual reality website, CoSpaces

Sessional Dates:
August 9 -13, 2021

Creating Cities (Currently in Grades 3 and 4)

Course Description: This session will be exploring the field of civil engineering by profiling Sarah Guppy, Nora Stanton Bentley, and other influential women that have helped to shape the field of engineering.

Participants will be guided through a variety of hands-on engineering activities and through the 3D design/virtual reality website, CoSpaces.

Sessional Dates:
July 12 - 16, 2021

Girls in Space (Currently in Grades 5 and 6)

Course Description: During this session, participants will explore a variety of engineering disciplines to better understand space.

Participants will be tasked with building their own simulators and running a series of experiments. They will also be introduced to coding through the 3D/virtual reality website, CoSpaces and the micro:bit

Sessional Dates:
July 19 - 23, 2021

Coding and a Healthy Life (Currently in Grades 5 and 6)

Course Description: This session will take a look at engineering solutions to support every day life including mental health and active living.

Participants will be guided through a variety of hands-on engineering activites and how to code using the 3D/virtual reality website, CoSpaces and the micro:bit.

Sessional Dates:
July 26 - 30, 2021