Mechatronics and Robotics Engineering

Get to know MECHATRONICS AND ROBOTICS ENGINEERING

Mechatronics is the combination of mechanical, electrical and computer engineering in the design of products and manufacturing processes.

Robotics is a subset of mechatronics –all robots are mechatronic!
Robotics, however, are an elevated class of mechatronics, incorporating automation, programming, and even autonomous action.

As automation and autonomous machines become increasingly important in our society, robotics – and its parent discipline, mechatronics – are more vital than ever.

Degree OPTIONS

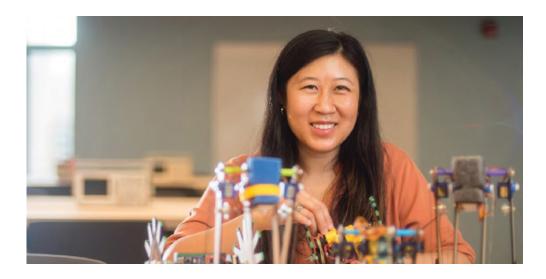
Bachelor of Applied Science in Engineering

Bachelor of Applied Science in Engineering with Professional Internship

Recommended concentration in Biomedical / Robotics / Automation / Intelligent Systems

Smith Engineering ADMISSIONS

The Mechatronics and Robotics Engineering program is a direct-entry program. Students apply to this program with code QEM through the OUAC (Ontario University Application Centre) website. Secondary School prerequisites include these five 4U courses, English 4U, Calculus and Vectors 4U, Advanced Functions 4U, Chemistry 4U, and Physics 4U. Applicants outside of Ontario may have additional requirements.



Course HIGHLIGHTS

Students in the MRE program will take newly developed courses as well as selected courses from the Department of Mechanical and Materials Engineering and the Department of Electrical and Computer Engineering. Courses include:

- Signals and Systems
- Sensors and Electric Actuators
- Introduction to Robotics
- Industrial Automation
- Fluid Mechanics and Fluid Power
- · Thermodynamics and Heat Transfer
- · Data Structures and Algorithms
- Intelligent Machines and Autonomous Systems
- Mechatronics and Robotics Design I to IV

From automation to robotics to autonomous vehicles, the MRE program delivers a rounded and demanding four year program that covers every aspect of the field.

Why Queen's MRE?

The Queen's MRE program has a number of unique features:

- Integrated design spine over four years
- New courses and labs tailored to the needs of a mechatronics and robotics engineer
- Balanced number of courses taken from Computer, Electrical and Mechanical programs
- Joint offering by two departments, Electrical and Computer Engineering, Mechanical and Materials Engineering



Acquire Skills. Gain Experience. Go Global.

That is a degree from Queen's.

mre.engineering.queensu.ca

Mechatronics and Robotics E

BACHELOR OF APPLIED SCIENCE | BACHELOR OF APPLIED SCIENCE WITH PROFESSIONAL INTERNSHIP

1ST YEAR 2ND YEAR **3RD YEA** GET THE **COURSES** Courses include: Fluid Mechanics and MRE students participate in many of the Fluid Power, Signals and Systems, YOU NEED common Smith Engineering first year Thermodynamics and Heat Transfer, Electric courses such as: Physics, Chemistry, Calculus, Circuits, Digital Systems, Kinematics and Graphics, and Linear Algebra. Dynamics, Electronics, Complex Analysis, Optimization and

You will take MREN 103: Mechatronics and Robotics Design I, the first course in the design spine that spans the four years of the program. You will also take MREN 178: Data Structures and Algorithms, a computer course that only MRE students take.

and Computer Architecture.

You will take MREN 203: Mechatronics and Robotics Design II, the second course in the design spine that spans the four years of the program.

Courses include: Actuators, Proba Processes, Indus Microprocessor Systems, Numer

You will take MR Robotics Design design spine tha program.

GET RELEVANT EXPERIENCE

Join teams or clubs on campus such as the SAE-GM AutoDrive II Challenge.

Apply to committees and positions that are open to first year students, such as the **ENGSOC Communications Team or First Year** Project Coordinators. See the **AMS Clubs** Directory or the Queen's Get Involved page for more ideas.

Look into summer jobs related to electrical engineering by talking to the department or Career Services about work through **SWEP** or NSERC.

Take more responsibility within different clubs or extracurriculars. Consider entrepreneurial opportunities at programs like the Oueen's Innovation Connector Summer Initiative.

Stay during the su a faculty member summer research

Consider applying MASc program, if Consider applying

internship between year.

CONNECTED **WITH THE** COMMUNITY

Volunteer on- or off-campus with different community organizations, such as **EngWeek** Committee or the ENGSOC Committee on Inclusivity.

Get involved with the Engineering Society (ENGSOC).

Join the MRE Club.

Do some targete working in caree LinkedIn group (Network.

Attend conferen **Engineering Con**

GET THINKING GLOBALLY

Speak to a QUIC advisor or get involved in their programs, events and training opportunities.

Prepare for work or studies in a multi-cultural environment by taking the Intercultural Awareness Training Certificate hosted by QUIC and FDISC, and research possible immigration regulations.

Is an exchange in your future? Start thinking about where you would like to study abroad. Apply in January for a 3rd year exchange through your faculty's International Office.

Build your interc getting involved practicing or imp

GET READY FOR LIFE AFTER **GRADUATION**

Grappling with program decisions? Go to the Orientation Evenings held by different Engineering departments and attend the various Career Fairs during the year.

Get help thinking about career options by visiting Career Services.

Explore different careers of interest in the Career Services Career Advising and Resource Area, by talking to people whose jobs interest you, or finding engineering alumni on LinkedIn.

Start focusing or education requir interest. If neede required tests (li get help thinking Career Service.

How to use this map

Use the 5 rows of the map to explore possibilities and plan for success in the five overlapping areas of career and academics. The map just offers suggestions – you don't have to do it all! To make your own custom map, use the My Major Map tool.

Queen's UNIVERSITY

Engineering MAJOR MAP

EAR

ude: Sensors and Electric robability and Random ndustrial Automation, Robotics, sor Interfacing and Embedded Imerical Methods and n and Automatic Control.

- MREN 303: Mechatronics and sign III, the third course in the that spans the fours years of the
- he summer as an assistant to nber or apply for an external earch opportunity.

olying for the combined BASc/m, if you meet the requirements.

olying to do a 12-16 month QUIP etween your third and fourth

rgeted networking with alumni areers of interest by joining the sup <u>Queen's Connects Career</u>

erences like the <u>Queen's</u> <u>Competition</u> (QEC).

ntercultural competence by lved with other cultures or by r improving your language skills.

ng on areas of interest. Research equirements for careers of eeded, prepare to take any its (like the LSAT or GMAT) and king about grad school from

4TH OR FINAL YEAR

All MRE students take two core courses (Mechatronics and Robotics Design IV, and Intelligent Machines and Autonomous Systems), 2 Complementary Studies courses, 3 Free Technical Electives, and 5 Primary Electives which can be selected from 4 concentrations:

- 1. Automation
- 2. Biomedical

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- 3. Intelligent Systems
- 4. Robotics

Investigate requirements for full-time jobs or other opportunities related to careers of interest.

Assess what experience you're lacking and fill in gaps with volunteering, clubs, or internships – check out Career Services workshops for help.

Consider joining professional associations like the <u>Institute of Electrical and Electronics Engineers</u> and <u>Professional Engineers Ontario</u>.

Join groups on LinkedIn reflecting specific careers or topics of interest in Electrical Engineering.

International students interested in staying in Canada can speak with an International Student Advisor.

Apply to jobs or future education, or make plans for other adventures. Get help from Career Services with job searching, resumes, interviews, grad school applications, or other decisions.

Employability skills

Smith Engineering will give you valuable skills to boost your employability:

- Understanding of mechatronic and robotic systems, with an appropriate level of knowledge of computer, electrical, and mechanical engineering
- Data analysis skills use current software to analyze data and model processes
- Research skills conduct scientific research and analyze quantitative information
- Problem solving approach problems from different perspectives and analyze individual facets of a problem
- Ability to work independently and in a team on a project
- Oral and written communication write clearly on technical topics and give presentations
- Time and resource management

Where could I go after graduation?

- Aerospace
- Aviation
- Autonomous vehicles
- Biomedical technology
- Biotechnology
- Construction
- Environmental technology
- Food production
- Green power systems
- Industrial automation
- Intelligent systems
- Manufacturing
- Pharmaceuticals
- Product design
- Robotics
- Sustainable mining
- Telecommunications
- Transportation

Taking time to explore career options, build experience, and network can help you have a smoother transition to the world of work after graduation.

*some careers may require additional training. Listed careers are suggestions.

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Get started thinking about the future now where do you want to go after your degree? Having tentative goals (such as careers or grad school) while working through your degree can help with short-term decisions about courses and experiences, but also help you keep motivated for success.

Get the help you need

Queen's provides you with a broad range of support services from your first point of contact with the university through to graduation. At Queen's, you are never alone. We have many offices dedicated to helping you learn, think and do.

Ranging from help with academics and careers, to physical, emotional, or spiritual resources - our welcoming living and learning environment offers the programs and services you need to be successful, both academically and personally. Queen's wants you to succeed! Check out the **Student** Affairs website for available resources.





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QUIPQUEEN'S UNDERGRADUATE

START DATES

in May, September, or January

are paid and full-time

POSITIONS WORK TERMS

are 12-16 months lona



- Graduate with a "Professional Internship" degree
- Learn about current advances, practices and technologies in business and industry.
- Test drive a career, earn a competitive salary, and get real world experience.



- 2nd or 3rd Year Students
- Minimum GPA of 1.9



- Gain a year of career-related work experience.
- Build network connections.
- Receive support from Queen's staff in job search and during internship.

SAMPLE PAST INTERNSHIPS



For more information, contact quip@queensu.ca or visit the Program Website.

Why study in Kingston?

For over 175 years, our community has been more than a collection of bright minds - Oueen's has attracted students with an ambitious spirit. Oueen's has the highest retention rates, the highest graduation rates, and one of the highest employment rates among recent graduates. We are a researchintensive university focused on the undergraduate experience. The BBC has identified Kingston as one of the GREATEST UNIVERSITY TOWNS in the world - and it is often identified as the safest city in Canada. It is a university city at the core; just a quick drive to Toronto, Montreal, Ottawa

..versity city, and an ants and even New York. At a university with more clubs per capita than any other university in Canada, and in a city with more restaurants per capita than any other city in North America, you will have the experience of London / 7 hrs CANADA **Oueen's** Beijing / 15 hrs a lifetime at Queen's Dubai / 14 hrs - and graduate Calgary / 4 hrs Vancouver / 5 hrs with a degree that is globally Halifax/2 hrs San Francisco / 5.5 hrs Kingston recognized Denver / 3 hrs among the New York / 1.5 hrs UNITED best. STATES Atlanta / 2 hrs Bermuda / 2 hrs