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

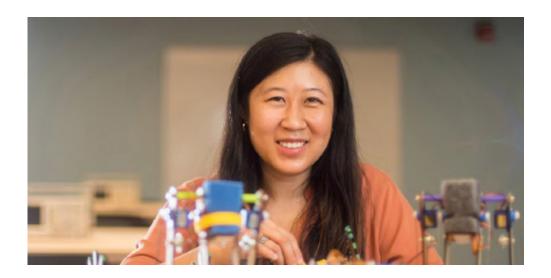
Bachelor of Applied Science in Engineering

Bachelor of Applied Science in Engineering with Professional Internship

Recommended concentration in Biomedical / Robotics / Automation / Intelligent Systems

Queen's ADMISSIONS

The Mechatronics and Robotics Engineering program is a direct-entry program. Students apply to Queen's Engineering (QE) 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 this rapidly evolving 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.

engineering.queensu.ca/mre

Mechatronics and Robotics Engineering MAJOR MAP

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

1ST YEAR **3RD YEAR** 2ND YEAR **GET THE** Courses include: Sensors and Electric MRE students participate in many of the Courses include: Fluid Mechanics and **COURSES** Actuators, Probability and Random common Queen's Engineering first year Fluid Power, Signals and Systems, YOU NEED Processes, Industrial Automation, Robotics, courses such as: Physics, Chemistry, Calculus, Thermodynamics and Heat Transfer, Electric Microprocessor Interfacing and Embedded Graphics, and Linear Algebra. Circuits, Digital Systems, Kinematics and Dynamics, Electronics, Complex Analysis, Systems, Numerical Methods and Optimization and Automatic Control. and Computer Architecture. You will take MREN 103: Mechatronics and Robotics Design I, the first course in the design You will take MREN 303: Mechatronics and You will take MREN 203: Mechatronics and spine that spans the four years of the program Robotics Design III, the third course in the Robotics Design II, the second course in the You will also take MREN 178: Data Structures design spine of the program. design spine of the program. and Algorithms, a computer course that MRE You will choose two out of four 3rd year students take. courses in Mechanical, Electrical, and Computer Engineering. **GET RELEVANT** Stay during the summer as an assistant to Look into summer jobs related to electrical Join teams or clubs on campus such as the **EXPERIENCE** a faculty member or apply for an external engineering by talking to the department or SAE-GM AutoDrive II Challenge. summer research opportunity. Career Services about work through SWEP or Apply to committees and positions that Consider applying for the combined BASc/ are open to first year students, such as the MASc program, if you meet the requirements. Take more responsibility within different clubs **ENGSOC Communications Team or First Year** or extracurriculars. Consider entrepreneurial Consider applying to do a 12-16 month QUIP Project Coordinators. See the AMS Clubs opportunities at programs like the Queen's internship between your third and fourth Directory or the Queen's Get Involved page for Innovation Connector Summer Initiative. more ideas. **GET ENGAGED** Volunteer on- or off-campus with different Get involved with the Engineering Society Do some targeted networking with alumni WITH THE (ENGSOC). community organizations, such as **EngWeek** working in careers of interest through COMMUNITY LinkedIn. Committee or the ENGSOC Committee on Join the MRE Club. Inclusivity. Attend conferences like the Queen's **Engineering Competition (QEC).** GET ENGAGED GLOBALLY Speak to a QUIC advisor or get involved Is an exchange in your future? Start Build your intercultural competence by in their programs, events and training thinking about where you would like to getting involved with other cultures or by opportunities. study abroad. Apply in January for a 3rd practicing or improving your language skills. Prepare for work or studies in a multi-cultural year exchange through your faculty's environment by taking the Intercultural International Office. Awareness Training Certificate hosted by QUIC and FDISC, and research possible immigration regulations. **GET CAREER** Start focusing on areas of interest. Research Grappling with program decisions? Go to Explore different careers of interest in **READY** education requirements for careers of the Orientation Evenings held by different the Career Services Career Advising and interest. If needed, prepare to take any Engineering departments and attend the Resource Area, by talking to people whose required tests (like the LSAT or GMAT) and various Career Fairs during the year. jobs interest you, or finding engineering get help thinking 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 recommended concentrations:

- Automation
- 2. Biomedical
- 3. Intelligent Systems
- Robotics

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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 Institute of **Electrical and Electronics Engineers** and Professional Engineers Ontario.

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 <u>Career Services</u> with job searching, resumes, interviews, grad school applications, or other decisions.

Find impactful work that aligns with your values using the Queen's Career Guide to the UN Sustainable Development Goals.

Knowledge & Workplace Skills

Your time at Queen's will give you valuable skills to boost your employability, including:

- 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

Career Possibilities

- 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

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.

Get some help deciding by visiting Career

Services.

alumni on LinkedIn.

Career Service.

Mechatronics and Robotics Engineering



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.





Smith Engineering
Beamish Munro Hall Room 112 & 113
45 Union St
(613) 533-6000 ext. 75369
mre.undergrad@queensu.ca

QUEEN'S UNDERGRADUATE INTERNSHIP PROGRAM

START DATES

in May, September, or January

POSITIONS

are paid and full-time

WORK TERMS

are 12-16 months long

PROGRAM OVERVIEW

- Graduate with "Professional Internship" on your degree
- Learn about current advances, practices and technologies in business and industry
- Explore a career path, earn a salary, and build workplace skills

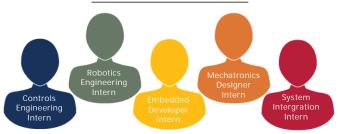
ELIGIBILITY

- Complete 1st year before you register
- Complete 2nd or 3rd year before your internship
- Minimum GPA of 1.9
- Return to Queen's after your internship to finish your degree

WHY QUIP?

- 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?

Since 1841, our community has been more than a collection of bright minds – Queen's has attracted students with an ambitious spirit. Queen's has the highest retention rates, the highest graduation rates, and one of the highest employment rates among recent graduates. We are a research-intensive 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 and

in a le're closer than you think 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 London / 7 hrs have the experience of Oueen's Beijing / 15 hrs a lifetime at Queen's - 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 Dallas / 3.5 hrs

Atlanta / 2 hrs

Bermuda / 2 hrs