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 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

2024-2025 Mechatronics and Robotics Engineering MAJOR MAP

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

	1ST YEAR	2ND YEAR	3RD YEAR		4TH OR FINAL YE
GET THE COURSES YOU NEED	MRE students participate in many of the common Queen's Engineering first year courses such as: Physics, Chemistry, Calculus, Graphics, and Linear Algebra. 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.	Courses include: Fluid Mechanics and Fluid Power, Signals and Systems, Thermodynamics and Heat Transfer, Electric Circuits, Digital Systems, Kinematics and Dynamics, Electronics, Complex Analysis, 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: Sensors and Electric Actuators,Probability and Random Processes, Industrial Automation, Robotics, Microprocessor Interfacing and Embedded Systems, Numerical Methods and Optimization and Automatic Control. You will take MREN 303: Mechatronics and Robotics Design III, the third course in the design spine that spans the fours years of the program.	ERNSHIP	 All MRE students take two core (Mechatronics and Robotics De and Intelligent Machines and Ar Systems), 2 Complementary Stu courses, 3 Free Technical Electiv Primary Electives which can be from 4 concentrations: 1. Automation 2. Biomedical 3. Intelligent Systems 4. Robotics
GET RELEVANT EXPERIENCE	Join teams or clubs on campus such as the SAE-GM AutoDrive II Challenge. Apply to <u>committees and positions</u> that are open to first year students, such as the ENGSOC Communications Team or First Year Project Coordinators. See the <u>AMS Clubs</u> <u>Directory</u> or the <u>Queen's Get Involved page</u> for more ideas.	Look into summer jobs related to electrical engineering by talking to the department or Career Services about work through <u>SWEP</u> or <u>NSERC</u> . Take more responsibility within different clubs or extracurriculars. Consider entrepreneurial opportunities at programs like the <u>Queen's</u> <u>Innovation Connector Summer Initiative</u> .	Stay during the summer as an assistant to a faculty member or apply for an external summer research opportunity. Consider applying for the combined BASc/ MASc program, if you meet the requirements. Consider applying to do a 12-16 month QUIP internship between your third and fourth year.	NTH QUIP INT	Investigate requirements for fu jobs or other opportunities rela careers of interest. Assess what experience you're and fill in gaps with volunteerin clubs, or internships – check ou Career Services <u>workshops</u> for
GET ENGAGED WITH THE COMMUNITY	Volunteer on- or off-campus with different community organizations, such as <u>EngWeek</u> <u>Committee</u> or the <u>ENGSOC Committee on</u> <u>Inclusivity</u> .	Get involved with <u>the Engineering Society</u> (ENGSOC). Join the MRE Club.	Do some targeted networking with alumni working in careers of interest by joining the LinkedIn group <u>Queen's Connects Career</u> <u>Network.</u> Attend conferences like the <u>Queen's</u> <u>Engineering Competition</u> (QEC).	A 12-16 MOI	Consider joining professional associations like the <u>Institute or</u> <u>Electrical and Electronics Engine</u> and <u>Professional Engineers Ont</u> Join groups on LinkedIn reflecti specific careers or topics of inte Electrical Engineering.
GET ENGAGED 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 <u>study abroad</u> . Apply in January for a 3rd year exchange through your faculty's International Office.	Build your intercultural competence by getting involved with other cultures or by practicing or improving your <u>language skills</u> .	CONSIDER /	International students intereste staying in Canada can speak wi International Student Advisor.
GET CAREER READY	Grappling with program decisions? Go to the <u>Orientation Evenings</u> held by different Engineering departments and attend the various <u>Career Fairs</u> during the year. Get help thinking about career options by visiting <u>Career Services</u> .	Explore different careers of interest in the Career Services <u>Career Advising and</u> <u>Resource Area</u> , by talking to people whose jobs interest you, or finding engineering alumni on <u>LinkedIn</u> .	Start focusing on areas of interest. Research education requirements for careers of interest. If needed, prepare to take any required tests (like the LSAT or GMAT) and get <u>help thinking about grad school</u> from Career Service.		Apply to jobs or future education or make plans for other advent Get help from Career Services of job searching, resumes, intervious grad school applications, or oth decisions.

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 <u>Major Map</u> tool.



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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 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 <u>Student</u> <u>Affairs website</u> for available resources.





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QUIPQUEEN'S UNDERGRADUATE INTERNSHIP PROGRAM



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

Design Intern

Civil Project

Management

Intern

Intern

Atlanta / 2 hrs

Bermuda / 2 hrs

Engineering &

Business Develope

Intern

Intern

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 more closer than you think 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 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 a lifetime at Queen's London / 7 hrs CANADA Queen's Beijing / 15 hrs - and graduate Dubai / 14 hi with a degree Calgary / 4 hrs Vancouver / 5 hrs that is globally recognized Halifax / 2 hrs San Francisco / 5.5 hrs among the Kingston Toronto Denver/3 hrs best. New York / 1.5 hrs UNITED STATES Dallas / 3.5 hrs