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

2023-2024

Mechatronics and Robotics Engineering MAJOR MAP

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

Queen's University

	1ST YEAR	2ND YEAR	3RD YEAR	4TH OR FINAL YEAR
GET THE COURSES YOU NEED	MRE students participate in many of the common Smith 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.	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 3. Intelligent Systems 4. Robotics
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 Queen's Innovation Connector Summer Initiative.	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.	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.
GET 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 targeted networking with alumni working in careers of interest by joining the LinkedIn group Queen's Connects Career Network. Attend conferences like the Queen's Engineering Competition (QEC).	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.
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 intercultural competence by getting involved with other cultures or by practicing or improving your language skills.	International students interested in staying in Canada can speak with an International Student Advisor.
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 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 help thinking about grad school from Career Service.	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.

CONSIDER A 12-16 MONTH QUIP INTERNSHIP

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.

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.

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
Queen's University

Department of Mechatronics and Robotics Engineering
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QUIP 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 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.

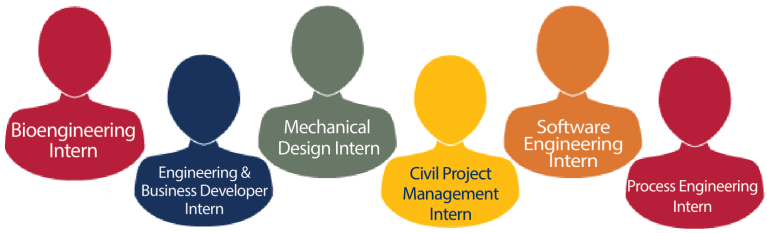
ELIGIBILITY

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

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?

For over 175 years, 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 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 – and graduate with a degree that is globally recognized among the best.