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 Mechatronics and Robotics Engineering (QEM) through the OUAC (Ontario University Application Centre) website. Secondary school prerequisites include five required 4U or 4M courses, one of which must be English 4U. Other required courses include:

- Calculus and Vectors 4U/4M
- Advanced Functions 4U/4M
- Chemistry 4U/4M
- Physics 4U/4M

A final competitive minimum grade of 80% must be obtained for all courses. Applicants outside of Ontario may have additional requirements.

Course HIGHLIGHTS

Students in the MRE program will take newly developed courses. Experts and researchers will be invited to the classroom to teach and work with students on experiential learning projects with real-world applications. Courses include:

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

From advanced physics to machine movement to artificial intelligence, the MRE program delivers a rounded and demanding four-year program that covers every aspect of the field.

Careers in MRE

An MRE degree will put students at the cusp of a rapidly growing field, in international demand as automation, controls, and systems engineers. Mechatronic and robotics engineers are needed in sectors ranging from manufacturing to aerospace; from construction to telecommunications.

Acquire Skills. Gain Experience. Go Global. That is a degree from Queen’s. mre.engineering.queensu.ca
**Mechatronics and Robotics Engineering MAJOR MAP**

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

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### GET THE COURSES YOU NEED

- **1ST YEAR**
  - MRE students participate in many of the common Queen's Engineering first year courses such as: Physics, Chemistry, Calculus, Graphics, and Linear Algebra.
  - MREN 103: Mechatronics Design I is an MRE-specific design course, focusing on problem solving, experimentation principles and finishing off with a team-based mechatronics engineering project.

- **2ND YEAR**
  - You will take MREN 203: Mechatronics Design II, the second course in the design spine that spans the four years of the program.

- **3RD YEAR**
  - You will take MREN 303: Mechatronics Design III, the third course in the design spine that spans the four years of the program.

- **4TH OR FINAL YEAR**
  - All MRE students take two core courses (Mechatronics Design IV, and Intelligent Machines and Autonomous Systems), 2 Complementary Studies courses, 3 Primary Technical Electives, and 2 Technical Electives which can be selected from 4 recommended concentrations:
    1. Automation
    2. Robotics
    3. Biomedical
    4. Intelligent Systems

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### GET RELEVANT EXPERIENCE

- **1ST YEAR**
  - 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.

- **2ND YEAR**
  - Look into summer jobs related to electrical engineering by talking to the department or Career Services about work through SWEF or NSERC.
  - Take more responsibility within different clubs or extracurriculars. Consider entrepreneurial opportunities at programs like the Queen’s Innovation Connector Summer Initiative.

- **3RD YEAR**
  - 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/MA Sc program, if you meet the requirements.
  - Consider applying to do a 12-16 month QUIP internship between your third and fourth year.

- **4TH OR FINAL 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.

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### GET CONNECTED WITH THE COMMUNITY

- **1ST YEAR**
  - Volunteer on or off campus with different community organizations, such as EngWeek Committee or the ENGSOC Committee on Inclusivity.

- **2ND YEAR**
  - Get involved with the Engineering Society (ENGSOC).

- **3RD YEAR**
  - 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).

- **4TH OR FINAL YEAR**
  - 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.

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### GET THINKING GLOBALLY

- **1ST YEAR**
  - 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 FOISCC, and research possible immigration regulations.

- **2ND YEAR**
  - 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.

- **3RD YEAR**
  - Build your intercultural competence by getting involved with other cultures or by practicing or improving your language skills.

- **4TH OR FINAL YEAR**
  - International students interested in staying in Canada can speak with an International Student Advisor.

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### GET READY FOR LIFE AFTER GRADUATION

- **1ST YEAR**
  - 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.

- **2ND YEAR**
  - Explore different careers of interest by reading books in the Career Services Career Advising and Resource Area, such as Vault Guide to Technology Careers, talking to people whose jobs interest you, or finding engineering alumni on LinkedIn.

- **3RD YEAR**
  - 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.

- **4TH OR FINAL YEAR**
  - 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.

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### Employability skills

Your time at Queen’s will give you valuable skills to boost your employability, including:
- Understanding of electronic circuit design, network analysis and object-oriented programming
- Data analysis skills - use current software to analyze data and model processes
- Proficiency in mathematics
- Attention to detail
- 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?
- Autonomous robotics
- Ambien intelligence
- Aviation and aerospace design
- Biotechnology
- Component design engineer
- Consumer electronics
- Digital systems design
- Electrical distribution engineer
- Fibre and laser electro-optics
- Game development/design
- Green power systems
- Information architecture
- Manufacturing and automation
- Sensory systems engineer
- Semiconductor design
- Security systems
- Wearable technology

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

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**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 (like 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.

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.