

MECHATRONICS AND ROBOTICS ENGINEERING

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The Mechatronics and Robotics Engineering (MRE) program addresses the emerging disciplines of mechatronics and robotics engineering, and integrates the traditional disciplines of computer, electrical, and mechanical engineering, with key elements of automatic control, mechanics, electronics, intelligent systems, signal processing and telecommunications systems. This multidisciplinary approach recognizes the ever-increasing complexity of engineering systems, and the societal need for skilled engineers. The MRE program addresses the need for a truly integrated approach to mechatronics and robotics across four years of study. A sequence of experiential project-based design courses will progressively build the students' foundational knowledge and culminate in a capstone design project that could lead to participation in an external design competition. Following a common two years of study (with the first year being direct-entry from high-school), in their third year students can pursue either an electrical or a mechanical stream. In their final year, students will select eight technical electives, with the option of completing one of four recommended concentrations: automation, robotics, biomedical and intelligent systems. This will give them the opportunity to tailor the curriculum to their own interests.

****Note - Information on this page may be out of date**

**Please view the current 2022-2023 Academic Calendar here: <https://calendar.engineering.queensu.ca/index.php> (<https://calendar.engineering.queensu.ca/>)

Mechatronics and Robotics Engineering, B.A.Sc (Class of 2025)

First Year 2021-2022

Code	Title	Units
MREN 103	Mechatronics Design I	4.00
MREN 178	Data Structures and Algorithms	4.00
APSC 101	Engineering Design & Practice	2.90
APSC 102	Experimentation	2.80
APSC 111	Physics I	3.30
APSC 112	Physics II	3.30
APSC 131	Chemistry And Materials	3.30

APSC 143	Introduction to Computer Programming for Engineers	3.30
APSC 162	Engineering Graphics	2.50
APSC 171	Calculus I	3.30
APSC 172	Calculus II	3.30
APSC 174	Introduction To Linear Algebra	3.30
APSC 182	Applied Engineering Mechanics	1.70
Total Units		41.00

Second Year 2022-2023

Code	Title	Units
MREN 203	Mechatronics Design II	4.00
MREN 223	Signals and Systems	4.00
MREN 230	Thermodynamics and Heat Transfer	3.75
MREN 241	Fluid Mechanics and Fluid Power	3.75
APSC 221	Economic And Business Practice	3.00
ELEC 221	Electric Circuits	4.25
ELEC 252	Electronics I	4.25
ELEC 271	Digital Systems	4.00
ELEC 274	Computer Architecture	4.00
MECH 228	Kinematics And Dynamics	3.50
MTHE 225	Ordinary Differential Equations	3.50
MTHE 228	Complex Analysis	3.50
Total Units		45.50

Third Year 2023-2024

Code	Title	Units
MREN 303	Mechatronics Design III	4.00
MREN 318	Sensors and Electric Actuators	5.50
MREN 320	Automation: Machine Design and Control	3.50
MREN 348	Intro to Robotics	3.50
ELEC 326	Probability & Random Processes	3.50
ELEC 371	Microprocessor Interfacing and Embedded Systems	4.00
ELEC 372	Numerical Methods and Optimization	3.50
MECH 350	Automatic Control	3.50
Plus choose one (1) Complementary Studies course		3.00

For the recommended Mechanical Stream, choose the following three (3) courses:

MECH 213	Manufacturing Methods
MECH 221	Solid Mechanics I
MECH 270	Materials Science and Engineering



For the recommended Electrical Stream, choose the following three (3) courses:

ELEC 280	Fundamentals of Electromagnets
ELEC 373	Computer Networks
ELEC 279	Introduction to Object Oriented Programming

Total Units **34.00**

Fourth Year 2024-2025

Code	Title	Units
MREN 403	Mechatronics Design IV	8.00
MREN 410	Intelligent Machines and Autonomous Systems	3.50

Two Complementary Studies courses

Three Free Technical Electives (Any FEAS course)

Five Primary Technical Electives (recommended Concentrations below):

Automation

ELEC 431	Power Electronics
MECH 423	Introduction To Microsystems
MECH 455	Computer Integrated Manufactur

Robotics

ELEC 436	Electric Machines And Control
ELEC 444	

Biomedical

ELEC 408	Biomedical Signal and Image Processing
MECH 393	Biomechanical Product Developm
MECH 394	Frontiers in Biomechanical Engineering
MECH 495	Ergonomics And Design
MECH 496	Musculoskeletal Biomechanics

Intelligent Systems

ELEC 421	Digital Signal Processing: Filters and System Design
ELEC 425	Machine Learning and Deep Learning
ELEC 472	Artificial Intelligence and Interactive Systems
ELEC 474	Machine Vision
CMPE 325	Human-Computer Interaction

Courses