List of Recommended Courses for the ECE Master of Engineering (MEng) Program

The ECE M.Eng. program follows the same subject tracks as our research program. In the following pages, you will find the list of recommended graduate and undergraduate courses for the ECE M.Eng. program for specialization and your broader interest in the main research/technical areas carried out in the Department of Electrical and Computer Engineering. These five main areas include *"Communication and Signal Processing", "Computer and Software Engineering", "Microelectronics, Electromagnetics, and Photonics"*, *"Power Electronics"*, and *"Robotics, Biomedical, and Intelligent Systems"*. Other courses that could also count towards your degree requirements are listed. Taking any course outside this list will require the Departmental approval on a case by case. For advice on taking courses not on the list, please contact your M.Eng. Advisor.

Before enrolling in a course, graduate students are strongly advised to check the course pre-requisites to make sure they have the right pre-requisites and background for the course. Also, for the Academic Project Option of the ECE M.Eng. program, M.Eng. students should plan on choosing a project supervisor among one of the faculty members who have instructed them in an approved course.

1. Communication and Signal Processing

Course No.	Recommended Courses
Queen's Smith Engineering	
APSC 896	Engineering Leadership and Innovation (only one APSC primary course)
APSC 888	Engineering Innovation and Entrepreneurship (only one APSC primary course)
Queen's Electrical and Computer Engineering	
ECE Graduate Courses	
ELEC 823	Signal Processing
ELEC 825	Machine Learning and Deep Learning
ELEC 827	Multimedia Signal Processing
ELEC 829	Optimization for Machine Learning
ELEC 860	Communication Network Analysis
ELEC 861	Probability, Random Variables and Stochastic Processes
ELEC 864	WDM Fiber Optic Communication System
ELEC 865	Coding Theory
ELEC 866	Signal Detection and Estimation
ELEC 867	Data Communication
ELEC 869	MIMO Communication Systems
ECE Undergraduate Courses	
ELEC 421	Digital Signal Processing: Filters and System Design
ELEC 425	Machine Learning and Deep Learning
ELEC 461	Digital Communications
ELEC 464	Wireless Communications
ELEC 472	Artificial Intelligence
ELEC 473	Cryptography and Network Security
Queen's Mathematics and Engineering	
MTHE Graduate Courses	

MTHE 806/406	Introduction to Coding Theory
MTHE/STAT 855/455	Stochastic Processes and Applications
MTHE 874/474	Information Theory
MTHE 877/477	Data Compression and Source Coding
MTHE Undergraduate Courses	
MTHE 478	Topics in Communication Theory
Queen's School of Computing	
Computing and Information Science Graduate Courses	
CISC 825	Paradigms of Wireless and Mobile Networking

Course No.	Other Courses
RMC Electrical and Computer Engineering	
RMC ECE Graduate Courses	
EE505	Satellite Communications
EE523	Integrated Navigation Systems
EE533	Hardware Implementation of Digital Signal Processing
EE550	Applied Deep Reinforcement Learning

2. Computer and Software Engineering

Course No.	Recommended Courses
Queen's Smith Engineering	
APSC 896	Engineering Leadership and Innovation (only one APSC primary course)
APSC 888	Engineering Innovation and Entrepreneurship (only one APSC primary course)
Queen's Electrical and Computer Engineering	
ECE Graduate Courses	
ELEC 825	Machine Learning and Deep Learning
ELEC 846	Runtime Verification
ELEC 872	Artificial Intelligence and Interactive Systems
ELEC 873	Cluster Computing
ELEC 875	Software Design Recovery and Automated Evolution
ELEC 876	Software Reengineering
ELEC 877	AI for Cybersecurity
ELEC 878	Extreme Scale Networking
ELEC 880	Machine Learning for Natural Language Processing
ELEC 881	Empirical Methods in Software Engineering
ECE Undergraduate Courses	
ELEC 425	Machine Learning and Deep Learning
ELEC 451	Digital Integrated Circuit Engineering
ELEC 470	Computer System Architecture
ELEC 471	Safety Critical Software Engineering
ELEC 472	Artificial Intelligence
ELEC 473	Cryptography and Network Security
ELEC 477	Distributed Systems
SOFT 423	Software Requirements
SOFT 437	Software Performance Analysis

Queen's School of Computing	
Computing and Information Science Graduate Courses	
CISC 834	MLOps and Software Release Engineering (Topics in Computer Systems)
CISC 832	Data Base Management Systems
CISC 835/422	Formal Methods in Software Engineering (Topics in Computer Systems)
CISC 836	Topics in Software Systems
CISC 848	Software Reliability and Security
CISC 850	Topics in Computer Applications & Algorithms I
CISC 856/CISC 474	Reinforcement Learning
CISC 858/458	Programming Language Processors
CISC 866/447	Introduction to Cybersecurity
CISC 867/CISC 473	Deep Learning
CISC 874	Neural and Cognitive Computing
CISC 878	Cryptography (Topics in Computer Applications & Algorithms II)
CISC 879	Topics in Theoretical Aspects of Computing II
CISC 880	Topics in Software Systems II (not offered 2024-2025)
CISC 886	Cloud Computing
Computing and Information Science Undergraduate Courses	
CISC 452	Neural and Genetic Computing
CISC 453	Topics in Artificial Intelligence
Computing in Engineering Undergraduate Courses	
CMPE 432	Advanced Database Systems
CMPE 434	Distributed Systems
RMC Electrical and Computer Engineering	
RMC ECE Graduate Courses	
EE 547	Digital Forensics
EE550	Applied Deep Reinforcement Learning
EE569	Malware Analysis

EE593	Advanced Network Traffic Analysis
EE595	Cyber Threat and Attack techniques
EE598	Artificial Intelligence in Cybersecurity

Course No.	Other Courses
Queen's Electrical and Computer Engineering	
ECE Graduate Courses	
ELEC 874	Deep Learning in Computer Vision
ELEC 879	Wearable and IoT Computing
ECE Undergraduate Courses	
ELEC 475	Computer Vision with Deep Learning
Queen's School of Computing	
Computing and Information Science Graduate Courses	
CISC 839/451	Topics in Data Analytics (Topics in Information Systems)
CISC 846	Software Design and Implementation
CISC 873	Data Mining
CISC 888	Advanced Research in Human Computer Interaction
Computing in Engineering Undergraduate Courses	
CMPE 425	Advanced User Interface Design
RMC Electrical and Computer Engineering	
RMC ECE Graduate Courses	
EE 597	Operational Technology Cybersecurity

3. Microelectronics, Electromagnetics, and Photonics

Course No.	Recommended Courses
Queen's Smith Engineering	
APSC 896	Engineering Leadership and Innovation (only one APSC primary course)
APSC 888	Engineering Innovation and Entrepreneurship (only one APSC primary course)
Queen's Electrical and Computer Engineering	
ECE Graduate Courses	
ELEC 852	Broadband Integrated Circuits
ELEC 853	Silicon RF and Microwave Circuits
ELEC 854	Microwave Circuits and Systems
ELEC 855	Nanoelectronics and Nano-Devices
ELEC 856	Introduction to Nanophotonics
ELEC 857	Selected Topics in RF Engineering
ELEC 860	Communication Network Analysis
ELEC 864	WDM Fiber Optic Communication Systems
ECE Undergraduate Courses	
ELEC 431	Power Electronics
ELEC 451	Digital Integrated Circuit Engineering
ELEC 454	Analog Electronics
ELEC 457	Integrated Circuits and System Applications
ELEC 481	Application of Photonics
ELEC 483	Microwave and RF Circuits and Systems
ELEC 486	Fiber Optic Communications
Queen's Physics and Engineering Physics	
Physics Graduate Courses	
Phys 860	Micro/Nanofabrication
Engineering Physics Undergraduate Courses	

ENPH 460	Laser Optics
RMC Electrical and Computer Engineering	
RMC ECE Graduate Courses	
EE537	Antenna Engineering
EE543	Radar Basics and Applications

4. Power Electronics

Course No.	Recommended Courses
Queen's Smith Engineering	
APSC 896	Engineering Leadership and Innovation (only one APSC primary course)
APSC 888	Engineering Innovation and Entrepreneurship (only one APSC primary course)
Queen's Electrical and Computer Engineering	
ECE Graduate Courses	
ELEC 830	Emerging Technologies in Power Grid
ELEC 831	Power Electronics
ELEC 832	Modeling and Control of Switching Power Converters
ELEC 834	Micro-Grid Technology
ELEC 835	Nonlinear Control for Power Electronics
ELEC 837	High Power Electronics
ECE Undergraduate Courses	
ELEC 431	Power Electronics
ELEC 433	Energy and Power Systems
ELEC 435	Energy Storage Technology
ELEC 436	Electric Machines and Control
RMC Electrical and Computer Engineering	
RMC ECE Graduate Courses	
EE539	Variable Speed Control of Electric Machines

Course No.	Other Courses
Queen's Electrical and Computer Engineering	
ECE Undergraduate Courses	
ELEC 443	Linear Control Systems

ELEC 454	Analog Electronics

5. Robotics, Biomedical, and Intelligent Systems

Course No.	Recommended Courses
Queen's Smith Engineering	
APSC 896	Engineering Leadership and Innovation (only one APSC primary course)
APSC 888	Engineering Innovation and Entrepreneurship (only one APSC primary course)
Queen's Electrical and Computer Engineering	
ECE Graduate Courses	
ELEC 825	Machine Learning and Deep Learning
ELEC 829	Optimization for Machine Learning
ELEC 841	Nonlinear Systems: Analysis and Identification
ELEC 842	Safe Learning-Based Control for Robotics
ELEC 843	Control of Discrete Event Systems
ELEC 844	Search and Planning Algorithms for Robotics
ELEC 845	Autonomous Vehicle Control and Navigation
ELEC 848	Control Systems Design for Robots and Telerobots
ELEC 870	Human-Robot Interaction
ELEC 872	Artificial Intelligence and Interactive Systems
ELEC 874	Deep Learning in Computer Vision
ELEC 879	Wearable and IoT Computing
ELEC 880	Machine Learning for Natural Language Processing
ELEC 888	Probabilistic Machine Learning
ECE Undergraduate Courses	
ELEC 408	Biomedical Signal and Image Processing
ELEC 409	Bioinformatic Analytics
ELEC 425	Machine Learning and Deep Learning
ELEC 443	Linear Control Systems
ELEC 444	Modeling and Computer Control of Mechatronic Systems
ELEC 446	Autonomous Mobile Robotics

ELEC 448	Introduction to Robotics
ELEC 472	Artificial Intelligence
ELEC 475	Computer Vision with Deep Learning
Queen's Mechanical and Material Engineering	
MME Graduate Courses	
MECH 816	Energetics & Mechanics of Locomotion
MECH 828	Biomechanics of Human Gait (not offered 2024-2025)
MECH 852	Mechatronics for Automation (not offered 2024-2025)
MECH 855	Bio-inspired Robot Locomotion
MECH 857	Robotics
MME Undergraduate Courses	
MECH 494	Kinematics of Human Motion
Queen's Chemical Engineering	
CHEE Graduate Courses	
CHEE 822	Model-Based Control
CHEE 827	System Optimization
Queen's School of Computing	
Computing and Information Science Graduate Courses	
CISC 855	Nonlinear Optimization
CISC 856/CISC 474	Reinforcement Learning
CISC 857	Image Processing
CISC 859	Pattern Recognition
CISC 867/CISC 473	Deep Learning
CISC 874	Neural and Cognitive Computing
CISC 881	Topics in Biomedical Computing I
Computing and Information Science Undergraduate Courses	
CISC 452	Neural and Genetic Computing

CISC 453	Topics in Artificial Intelligence
Computing in Engineering Undergraduate Courses	
CMPE 452	Neural Networks and Genetic Algorithms
CMPE 457	Image Processing and Computer Vision
RMC Electrical and Computer Engineering	
RMC ECE Graduate Courses	
EE503	Wheeled Mobile Robots: Modeling, Control and Instrumentation
EE523	Integrated Navigation Systems
EE535	Adaptive Control Systems
EE550	Applied Deep Reinforcement Learning

Course No.	Other Courses
Queen's Electrical and Computer Engineering	
ECE Graduate Courses	
ELEC 823	Signal Processing
ELEC 861	Probability, Random Variables and Stochastic Processes
Queen's Mechanical and Material Engineering	
MME Graduate Courses	
MECH 823	Micro-Electro-Mechanical Systems (MEMS) (not offered 2024-2025)
MECH 829	Tissue Mechanics
MME Undergraduate Courses	
MECH 423	Introduction to Microsystems
MECH 452	Mechatronics Engineering
MECH 455	Computer Integrated Manufacturing
MECH 456	Introduction to Robotics
MECH 465	Computer-Aided Design

MECH 478	Biomaterials
MECH 496	Musculoskeletal Biomechanics
Queen's Mathematics and Engineering	
MTHE Graduate Courses	
MTHE 830/430	Modern Control Theory
Queen's Mining Engineering	
Mining Graduate Courses	
MINE 835	Applied Machine Learning
MINE 852	Mine Mechanization and Automation
Mining Undergraduate Courses	
MINE 472	Mining Systems, Automation, and Robotics
Queen's Chemical Engineering	
CHEE Graduate Courses	
CHEE 927	Advanced Global Optimization
Queen's School of Computing	
Computing and Information Science Graduate Courses	
CISC 854/CISC 454	Computer Graphics
CISC 875	Bioinformatics
CISC 888	Advanced Research in Human Computer Interaction
Computing in Engineering Undergraduate Courses	
CMPE 425	Advanced User Interface Design