Information Slides to prepare for the 2024-2025 Academic Year

ECE 3rd Year Course Registration

May 2024
ECE Advisors

• ECE UG Assistants (WLH-416)
  - Irina Pavich (irina.pavich@queensu.ca), Last Names A – L;
  - Jazmine Battle (j.battle@queensu.ca), Last Names M – Z;

• EE Undergraduate Chair:
  - Prof. Il-Min Kim (eeugradchair@queensu.ca)

• CE Undergraduate Chair:
  - Prof. Jianbing Ni (ceugradchair@queensu.ca)

• UG Program Advisors https://smithengineering.queensu.ca/ece/undergraduate/contacts.html
  - Exchange Program/Transfer: Prof. Brian Frank
Academic Calendar and Registration Dates

• End of June - 2024-2025 Academic Calendar is published

• End of June – 2024-2025 Timetable is published

• July – course Pre-Load (students will be preloaded into 3rd year core courses, if the prerequisites are met)

• July 22nd – enrollment begins (check your enrollment appointment day/time on Solus) - time to add optional core course/s and electives.

Useful Links:

Registration Guide
Graduation Guide
SOLUS Help
Student Wellness Services
Online Resources

• OUR
  - Academic Calendar, Academic Plans and course information; FEAS Policies and Regulations;
  - Tuition, Graduation, Sessional Dates etc.
  - SOLUS Help:

• Smith Engineering
  - FORMS: Substitution request, Incomplete Grade Request, Late Course Add/Drop requests, Waivers etc.;
  - Smith Engineering Student Services resources: academic considerations, accommodations, embedded counsellors, dual degree, supplemental exam, awards etc.

• ECE
  - ECE Degree Planning Spreadsheets, Pre-requisite Charts, Course Information
  - ECE Faculty
  - Booking an appointment with the advisor
Curriculum Updates

New elective courses:

1. ELEC 446 Mobile Robotics (CE, EE) - Fall
2. ELEC 471 Safety Critical Software Engineering (CE) – Fall
3. ELEC 435 Energy Storage Technology (EE) - Winter
Computer Engineering Graduation Requirements

• Satisfy the minimum Accreditation Units (AU) set by ECE in each CEAB category

• Have at least 5 four-hundred level elective courses

• Have at least 3 courses from Electives Lists A and B that satisfy the Department criteria for qualified accreditation units in the categories of engineering science and engineering design

• Have at least 3 courses from Elective List B

• Counting required core courses and elective courses in all four years, result in a total of no fewer than 157.5 (160.5 for ECEi) credits for the complete program.
### Computer Engineering, 3rd Year Curriculum

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 326 Probability</td>
<td>ELEC 373 Computer Networks</td>
</tr>
<tr>
<td>ELEC 371 Microprocessor Interfacing…</td>
<td>ELEC 374 Digital Systems Engineering</td>
</tr>
<tr>
<td>ELEC 377 Operating Systems</td>
<td>ELEC 390 ECE 3rd Year Design</td>
</tr>
<tr>
<td>ELEC 379 Algorithms with Engineering Application</td>
<td>APSC 221 Eng. Economics (F/W/S) non-ECEi only</td>
</tr>
<tr>
<td><strong>Optional Core: ELEC 376 Soft. Dev. Methodology (F)</strong> -OR-</td>
<td><strong>Optional Core: CMPE 223 Software Specifications (W)</strong></td>
</tr>
<tr>
<td>One Technical Elective (any term, F or W)</td>
<td>One Complementary Studies Elective (any term, F or W)</td>
</tr>
<tr>
<td><strong>Innovation Stream</strong></td>
<td></td>
</tr>
<tr>
<td>COMM 301 Launching New Ventures (ECEi only)</td>
<td>COMM 302 Funding New Ventures (ECEi only)</td>
</tr>
</tbody>
</table>
# CE: Technical Electives offered by the ECE Department

<table>
<thead>
<tr>
<th>Fall 2024</th>
<th>Winter 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEC 324</strong> Discrete-Time Signals &amp; Systems, F, P.Eng</td>
<td><strong>ELEC 224</strong> Cont.-Time Signals &amp; Systems, W, P.Eng</td>
</tr>
<tr>
<td><strong>ELEC 345</strong> Sensor Fabrication Technologies, F</td>
<td><strong>ELEC 372</strong> Numerical Methods and Optimization, W</td>
</tr>
<tr>
<td><strong>ELEC 353</strong> Electronics II, F, P.Eng</td>
<td><strong>ELEC 408</strong> Biomedical Signal &amp; Image Processing, W</td>
</tr>
<tr>
<td><strong>ELEC 376</strong> Software Dev. Methodology (Opt. Core), F</td>
<td><strong>ELEC 421</strong> Digital Signal Processing: Filters and Syst., W, P.Eng</td>
</tr>
<tr>
<td><strong>ELEC 409</strong> Bioinformatic Analytics, F, P.Eng</td>
<td><strong>ELEC 425</strong> Machine Learning &amp; Deep Learning, W, EIT</td>
</tr>
<tr>
<td><strong>ELEC 431</strong> Power Electronics, F, P.Eng</td>
<td><strong>ELEC 464</strong> Wireless Communications, W, P.Eng</td>
</tr>
<tr>
<td><strong>ELEC 443</strong> Linear Control Systems, F, P.Eng</td>
<td><strong>ELEC 470</strong> Computer Syst. Architecture, W, P.Eng</td>
</tr>
<tr>
<td><strong>ELEC 446</strong> Mobile Robotics, F, P.Eng</td>
<td><strong>ELEC 472</strong> Artificial Intelligence, W, P.Eng</td>
</tr>
<tr>
<td><strong>ELEC 471</strong> Safety Critical Software Engineering, F</td>
<td><strong>ELEC 477</strong> Distributed Systems, W, Eng. License</td>
</tr>
<tr>
<td><strong>ELEC 473</strong> Cryptography and Network Security, F, EIT</td>
<td><strong>MREN 348</strong> Introduction to Robotics, W, P.Eng</td>
</tr>
<tr>
<td><strong>ELEC 475</strong> Computer Vision with Deep Learning, F, P.Eng</td>
<td><strong>MREN 348</strong> Introduction to Robotics, W, P.Eng</td>
</tr>
<tr>
<td><strong>SOFT 437</strong> Performance Analysis, F, P.Eng</td>
<td><strong>MREN 348</strong> Introduction to Robotics, W, P.Eng</td>
</tr>
</tbody>
</table>

*Courses that require CE core prerequisites only*

*New! New! New!*
# CE: Technical Electives offered by the School of Computing

<table>
<thead>
<tr>
<th>Fall 2024</th>
<th>Winter 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMPE 204 Logic for Computing Science</td>
<td>CMPE 204 Logic for Computing Science</td>
</tr>
<tr>
<td>CMPE 251 Data Analytics</td>
<td>CMPE 223 Software Specifications (Opt. Core)</td>
</tr>
<tr>
<td>CMPE 327 Software Quality Assurance</td>
<td>CMPE 322 Software Architecture</td>
</tr>
<tr>
<td>CMPE 330 Computer-Integrated Surgery</td>
<td>CMPE 325 Human-Computer Interaction</td>
</tr>
<tr>
<td>CMPE 452* Neural and Genetic Computing</td>
<td>CMPE 351 Advanced Data Analytics</td>
</tr>
<tr>
<td>CMPE 457 Image Processing &amp; Comp. Vision</td>
<td>CMPE 454 Comp. Graphics</td>
</tr>
<tr>
<td></td>
<td>CMPE 458 Program. Language Processors</td>
</tr>
<tr>
<td></td>
<td>SOFT 423 S/W Requirements</td>
</tr>
</tbody>
</table>

*ELEC 425 and CMPE 452 are exclusions; only one course from the pair counts toward the degree requirements.

ELEC 376 and CMPE 223 are Optional Core; if both are completed – CMPE 223 counts toward a List B elective.
Technical Electives in Computer Engineering – prerequisite flowchart
Electrical Engineering Graduation Requirements

• Satisfy the minimum Accreditation Units (AU) set by ECE in each CEAB category

• Have at least **5 courses** from Electives **List A**

• Have at least **5 four-hundred level elective courses**

• Counting required core courses and elective courses in all four years, result in a total of no fewer than **157.5** (160.5 for **ECEi**) credits for the complete program
# Electrical Engineering, 3rd Year Curriculum

<table>
<thead>
<tr>
<th>Fall</th>
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<tr>
<td>ELEC 324 Discrete-Time Signals and Systems</td>
<td>ELEC 372 Numerical Methods and Optimization</td>
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<tr>
<td>ELEC 326 Probability</td>
<td>ENPH 336 Solid State Devices</td>
</tr>
<tr>
<td>ELEC 353 Electronics II</td>
<td>ELEC 390 ECE 3rd Year Design</td>
</tr>
<tr>
<td>ELEC 371 Microprocessor Interfacing...</td>
<td>APSC 221 Eng. Economics (F/W/S) non-ECEI only</td>
</tr>
<tr>
<td>ELEC 381 Applications of Electromagnetics</td>
<td></td>
</tr>
<tr>
<td><strong>One Technical Elective (any term, F or W)</strong></td>
<td></td>
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<td><strong>Innovation Stream</strong></td>
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<td>COMM 301 Launching New Ventures (ECEI only)</td>
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</tr>
</tbody>
</table>

1. Innovation Stream
2. One Technical Elective
3. One Complementary Studies Elective

**Fall**
- ELEC 324 Discrete-Time Signals and Systems
- ELEC 326 Probability
- ELEC 353 Electronics II
- ELEC 371 Microprocessor Interfacing...
- ELEC 381 Applications of Electromagnetics

**Winter**
- ELEC 372 Numerical Methods and Optimization
- ENPH 336 Solid State Devices
- ELEC 390 ECE 3rd Year Design
- APSC 221 Eng. Economics (F/W/S) non-ECEI only
EE: Technical Electives

List A for ECE-controlled courses

ELEC 270 Discrete Mathematics
ELEC 279 Intro to Object-Oriented Programming
ELEC 333 Electric Machines
ELEC 345 Sensor Fabrication Technologies
ELEC 373 Computer Networks
ELEC 374 Digital Systems Engineering
ELEC 408 Biomedical Signal and Image Processing
ELEC 409 Bioinformatic Analytics
ELEC 421 Digital Signal Processing: Filters and Systems Design
ELEC 425 Machine Learning and Deep Learning
ELEC 431 Power Electronics
ELEC 433 Energy and Power Systems
ELEC 435 Energy Storage Technology New!
ELEC 436 Electric Machines And Control
ELEC 443 Linear Control Systems
ELEC 446 Mobile Robotics New!
ELEC 448 Introduction to Robotics as MREN 348

ELEC 457 Integrated Circuits and System Application
ELEC 464 Wireless Communications
ELEC 470 Computer System Architecture
ELEC 472 Artificial Intelligence
ELEC 473 Cryptography and Network Security
ELEC 475 Computer Vision with Deep Learning
ELEC 486 Fiber Optic Communication
ELEC 497 Research Project
EE: Technical Electives

List B - external courses

APSC 303 Professional Internship
APSC 400 Technology, Engineering & Management (TEAM) – Not offered
APSC 401 Interdisciplinary Projects
CHEE 340 Biomedical Engineering
ENPH 460 Laser Optics
CMPE 3XX Any Third Year Computing Science Course | 3
CMPE 4XX Any Fourth Year Computing Science Course | 3
MTHE 337 Intro. To Operations Research
MTHE 367 Engineering Data Analysis
MTHE 430 Control Theory
MTHE 455 Stochastic Processes & Applications
MTHE 472 Optimization and Control of Stochastic Systems
MTHE 474 Information Theory
MTHE 477 Data Compression and Source Coding: Theory and Algorithms
MTHE 478 Topics in Communication Theory
MECH 228 Kinematics and Dynamics
MECH 328 Dynamics and Vibration
MECH 393 Biomechanical Product Development
MECH 423 Introduction to Microsystems
MECH 455 Computer Integrated Manufacture
MECH 465 Computer Aided Design
MECH 478 Biomaterials
MECH 494 Kinematics of Human Motion
## Electrical Engineering: ECE Course Offerings in 2024-25

<table>
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<th>Fall 2024</th>
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<td>ELEC 435  Energy Storage Technology</td>
</tr>
<tr>
<td>ELEC 475  Computer Vision with Deep Learning</td>
<td>ELEC 436  Electric Machines and Control</td>
</tr>
</tbody>
</table>

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**New!**

ELEC 470  Computer System Architecture
ELEC 472  Artificial Intelligence
ELEC 486  Fiber Optic Communications
MREN 348  Introduction to Robotics
Technical Electives in Electrical Engineering – prerequisite flowchart
Design and Research Project Courses

ELEC 390 Principles of Design and Development
  o topics in applied design principles, testing, teamwork, and communication;

ELEC 490/498 capstone design project courses
  o prerequisites: 3rd year core courses incl. ELEC 390
  o instructors and project supervisors
  o group of 3 to design/build/document

ELEC 497 Research project (available to 4th year students)
  o For those with an interest in exploring in depth some technical area in a more independently-driven research study
Complementary Studies Program Requirement

Complementary Studies – not Innovation Stream

- Must have a total of 9 credits (108 units) of CS:
  - 1 course (or 3 credits) must be from List A (Humanities and Social Sciences)
  - Remaining 2 courses (or 6 credits) can be from List A or List B

- Typically take 1 CS course in each of 2\textsuperscript{nd}, 3\textsuperscript{rd}, and 4\textsuperscript{th} year, but whenever it can fit into schedule is fine (e.g., PSYC100 is 6 credits and goes fall and winter);

- Some CS courses are available online (see Arts and Science ONLINE, SSB online, LAW online etc.)
# Innovation Stream: Business & Complementary Studies

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>COMM 201 – Introduction to Business for Entrepreneurs</td>
<td>F</td>
</tr>
<tr>
<td>3rd</td>
<td>COMM 301 – Funding New Ventures</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>COMM 302 – Launching New Ventures</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td>List “A” Complementary Studies Course</td>
<td>F/W/S</td>
</tr>
<tr>
<td>4th</td>
<td>COMM 405 – New Business Development</td>
<td>F</td>
</tr>
</tbody>
</table>

ECEi: No reduction in technical content
Course Preload in 3rd Year

• Student are enrolled in 3rd year core courses by the department in July.

Please note the following:

• 3rd year Students can self-enroll in both core and elective courses;

• Students can swap course sections from their Solus account or drop courses before the drop deadline;

• Students need to self-register in Optional Core courses (not preloaded), complementary studies electives, technical electives;

• APSC 221 will be auto-loaded into 3rd year Winter semester, however Students can choose to register in APSC 221 in any term – Fall or Winter;

• Students are unable to register in a course with a missing prerequisite.

• Students are unable to self-register in first year APSC courses, 2nd year core courses.

SOLUS tutorials
The Career Services office is always available to help (Engineering & Technology fair, Summer job fair etc.)

Queen’s University Internship Program (QUIP):

- Internships are 12 to 16 month, paid, professional work experiences;
- Eligible to participate after completing your 2nd or 3rd year of studies;
- The QUIP courses count towards your Professional Internship Designation and towards your degree requirements (3.5 technical credits, under List B electives – both EE and CE programs);
- Internship courses require tuition. APSC 302 and APSC 303 carry tuition fee of 3.5 units per course and the tuition for them is due September 1st.
- Students can register in one academic course per term while on internship.
STREAMS – Flexibility

• ECE with streams instead of options
  - Suggested streams give a coherent set of courses in a particular area, e.g., mechatronics. Use interest and passion as your guide;
  - Streams provide primary and secondary course suggestions; primary courses are essential for a given concentration;
  - Streams allow you to mix and match as you wish and provide larger number of courses to choose from;
CE Streams

Streams of Specialization for Elective Courses in Computer Engineering

- Computer Hardware
- Computer Systems
- Software Engineering
- Mechatronics
- Artificial Intelligence
EE Streams

Streams of Specialization for Elective Courses in Electrical Engineering

- Biomedical Engineering
- Communications and Signal Processing
- Communication Systems and Networks
- Nanoelectronics and Photonics
- Mechatronics
- Power Electronics and Systems
- Robotics and Control
Exclusions - only one course counts towards the degree requirements

ELEC 425 Machine Learning (List A TE) and CMPE 452 Neural Networks (List B TE)

ELEC 425 Machine Learning and Deep Learning  F|3.5
Lecture:3
Lab: 0.25
Tutorial: 0.25

Academic Units
Mathematics 11
Natural Sciences 0
Complementary Studies 0
Engineering Science 20
Engineering Design 11

PREREQUISITE(S): ELEC 278 or CISC 235, ELEC 326 or permission of the instructor
EXCLUSION(S): CMPE452 Neural and Genetic Computing

ELEC 474 Machine Vision (List A TE) and CMPE 457 Image Processing & Computer Vision (List B TE)
Substitutions

• Courses in each curriculum (CORE, TECH, COMP) meet CEAB requirements and Faculty regulations and have been approved by the Operations Committee

• If a student takes a course that is not on the approved curriculum for their program, the course will not count towards their program

      .......except.......  

• Sometimes a student can substitute a course with

  a) Courses taken during the summer at another university
  
  b) Courses taken while on exchange at another university
  
  c) Courses that are not on the approved TECH lists
  
  d) A course to replace a CORE course. (NOTE: This form of substitution is rare and requires detailed information as to why the student is not taking the CORE course at their home university.
Substitution Process

1. Send an email with the substitution request form to the Undergraduate Program Assistant (UPA) indicating the course you would like to take and what course you would like to substitute it for. Also include a web link to the following information:
   a) Course syllabus
   b) Total # of lecture/lab/tutorial hours
   c) Course grading scheme
   d) Reason why you would like to substitute one course with another

2. Instructor Signature:
   a) CORE/TECH Courses: The instructor of the course to be substituted will also need to sign the form as an indication that the course is a good substitute
   b) Complementary Studies Courses: No instructor signature required

3. UPA will submit the course substitution material(s) to the Undergraduate Program Chair for review. The UG Chair will sign the form if they support the request.

4. UPA then submit the completed paperwork to the Faculty Office for review by the Operations Committee. For courses taken outside of Queen's, the $60.00 administration fee needs to be paid via online system at https://store.engineering.queensu.ca/index.php?main_page=index&cPath=8

5. You will receive an email from the Faculty Office with the Operations Committee's decision. This email can be used as a letter of permission to register for courses at another institution.
Prerequisites

- Prerequisites: capture material necessary to do the course
  - If the professor thought you could do the course without knowing that material, it would not have been made a prerequisite

- So prerequisites only waived in exceptional circumstances
  - Submit to Undergraduate Program Assistant the Prerequisite Waiver Form which asks Undergrad Chair to waive prerequisite:

  http://my.engineering.queensu.ca/Current-Students/Registration-Guide/files/Prerequisite_CorequisiteWaiver.pdf

- Before submitting the form, the instructor of the course for which the waiver is required must approve the waiver justification in writing (sign the form or provide the approval over the email)
Timetabling

• Timetabling of all courses is done by University Registrar centrally each year

• No guarantee that desired combinations of electives are completely conflict-free
  - ECE Dept. makes requests to Registrar to help avoid conflicts, but no guarantee

• You must be flexible in 3rd year and 4th year, as needed
Course Planning

• Use your **degree planning spreadsheet** to verify that all program requirements will be met

• Follow Calendar & all preregistration instructions

  ❑ Confirm core courses are preloaded

  ❑ Select electives (technical and/or complementary studies)

  ❑ Check course prerequisites and **exclusions**

  ❑ Submit substitution requests for courses outside ECE that are not listed as official technical electives (CISC, MECH, MTHE)

  ❑ **AVOID** **Negative Service Indicators** (SOLUS account, unpaid tuition). [Log on to SOLUS](https://solus.queensu.ca) to view your financial account to see if you have any outstanding debts. The University Registrar's Office can be reached at [solus@queensu.ca](mailto:solus@queensu.ca) about registration or payment.

• Respect deadlines to avoid difficulties (Add/Drop courses)
Course Planning

• Not all electives offered every year. Some 400 level courses will not be offered the following year
  ➢ Plan both 3rd and 4th years together!

• You are not limited to ‘300’ level technical courses;

• If you have prerequisites for a ‘400’ level elective & it fits in your timetable, you can take it in your 3rd year;

• APSC 221 F/W/S (not for ECEi)

• Use the Calendar Information and the ECE planning spreadsheets to ensure you are on track to complete all requirements by the end of the fourth year. This is one of the most important responsibilities for all ECE students.
## Tuition

### Engineering and Applied Science

Tuition is assessed on a per-unit basis up to 16.1 credits per term. The maximum per term tuition is equal to 1/2 of the tuition fee.

### Fall/Winter Domestic (Ontario)

Registration in the Engineering & Applied Science Extended (900 section) program incurs a fee of $539.03 per course. Supplemental examination incurs a fee of $100 per exam (see [faculty calendar](#) for details).

**Normal Units: 32.2**

<table>
<thead>
<tr>
<th>Fee</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Fee</td>
<td>$370.02</td>
</tr>
<tr>
<td>Fall Tuition &amp; SAL</td>
<td>$6,006.82</td>
</tr>
<tr>
<td>Due Sept 1</td>
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<tr>
<td>Ancillary Fees</td>
<td>$1,347.94</td>
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<tr>
<td>Due Sept 30</td>
<td></td>
</tr>
<tr>
<td>Winter Tuition &amp; SAL</td>
<td>$6,006.82</td>
</tr>
<tr>
<td>Due Jan 10</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$13,361.58</td>
</tr>
</tbody>
</table>

### Fall/Winter Domestic (outside of Ontario)  

### Fall/Winter International

### Summer Domestic
Degree Planning Spreadsheet

- Electrical Engineering
- Computer Engineering