Faculty of Engineering and Applied Science

Department of Electrical and Computer Engineering

Information Slides to prepare for the 2022-2023 Academic Year

March 2022
• ECE UG Assistants
  • Irina Pavich (irina.pavich@queensu.ca), WLH-416
  • Alisa Darbinyan (alisa.darbinyan@queensu.ca), WLH-416

• EE Undergraduate Chair:
  • Prof. Karen Rudie (eeugradchair@queensu.ca)

• CE Undergraduate Chair:
  • Prof. Jenny Zou (ceugradchair@queensu.ca)

• UG Program Advisors https://www.ece.queensu.ca/undergraduate/contacts.html
  • ELEC: Prof. Majid Pahlevani
  • CMPE: Prof. Xiaodan Zhu
  • Exchange Program/Transfer: Prof. Brian Frank
Faculty of Engineering and Applied Science (FEAS)

- 2022-2023 FEAS Academic Calendar - in progress!
- Policies and Regulations
- FORMS: Substitution request, Incomplete Grade request, Supplemental Exam request, Late Course Add/Drop requests, Waivers etc.
- Resources (academic considerations, accommodations, embedded counsellors, exchange program, dual degree, supplemental exam, EPT etc.)
Online Resources

Dept. of Electrical and Computer Engineering web site

- **ECE Degree Planning Spreadsheets**
- **ECE Undergraduate Courses**
- **ECE Wiki**
- **ECE Course Offering List**
- **EE/CE Prerequisite Charts**
- **ECE research groups, ECE faculty contact information**
- **Book an academic advising appointment**

(Available at ece.queensu.ca)
Computer Engineering

• 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, B and C 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 credits for the complete program.
CMPE Program Core in Third Year

**FALL**
- ELEC 326 Probability & Random Processes
- ELEC 371 Microprocessor Interfacing ...
- ELEC 377 Operating Systems
- CMPE 365 Algorithms I

**WINTER**
- ELEC 373 Computer Networks I
- ELEC 374 Digital Systems Engineering
- ELEC 390 ECE Design

*Optional Core:*
- CMPE 320 Fund. Software Develop
- OR CMPE 223 Software Specification

1 Technical Elective Course (any term)
Complementary Studies (F/W/S)
Non-ECEi: APSC 221 Economics... (F/W/S)

**COMM 301 Launching New Ventures (ECEi) | COMM 302 Funding New Ventures (ECEi)**
Computer Engineering

- **List A** for ECE-controlled courses (ELEC and SOFT);
- **List B** for external courses (mainly CMPE);
- **List C** for Internship and project-based courses;
## Electives List A
- ELEC 224 Continuous-Time Signals and Systems
- ELEC 324 Discrete-Time Signals and Systems
- ELEC 344 Sensors and Actuators
- ELEC 353 Electronics II
- ELEC 372 Numerical Methods and Optimization
- ELEC 408 Biomedical Signal and Image Processing N/O
- ELEC 409 Bioinformatic Analytics
- ELEC 421 Digital Signal Processing...
- ELEC 422 Digital Signal Processing...
- **ELEC 425 Machine Learning and Deep Learning**
- ELEC 431 Power Electronics
- ELEC 443 Linear Control Systems
- ELEC 444 Modeling & Comp. Control of Mechatronic Syst. N/O
- ELEC 448 Introduction to Robotics: Mechanics and Control
- ELEC 451 Digital Integrated Circuit Engineering
- ELEC 461 Digital Communications N/O
- ELEC 464 Wireless Communications
- ELEC 470 Computer System Architecture
- ELEC 472 Artificial Intelligence and Interactive Systems
- ELEC 473 Cryptography and Network Security
- ELEC 474 Machine Vision
- ELEC 497 Research Project
- SOFT 423 Software Requirements
- SOFT 437 Performance Analysis

## Electives List B
- CMPE 204 Logic for Computing Science
- CMPE 251 Data Analytics
- CMPE 320 Fundamentals of Software Development
- CMPE 322 Software Architecture
- CMPE 325 Human-Computer Interaction
- CMPE 327 Software Quality Assurance
- CMPE 332 Database Management Systems
- CMPE 351 Advanced Data Analytics
- CMPE 422 Formal Methods in Software Engineering
- CMPE 425 NOT OFFERED 2022-23 Adv. User Interface Design
- CMPE 432 NOT OFFERED 2022-23 Adv. Database Systems
- CMPE 434 NOT OFFERED 2022-23: Distributed Systems
- CMPE 452 Neural Networks and Genetic Algorithms
- CMPE 454 Computer Graphics
- CMPE 457 Image Processing and Computer Vision
- CMPE 458 Programming Language Processors
- ENPH 336 Solid State Devices

## Electives List C
- APSC 303 Professional Internship
- APSC 400 Technology, Engineering & Management N/O
- APSC 401 Interdisciplinary Projects
ELEC 390/490/498 design project courses

- Instructors and project supervisors
- Groups of 3 to design/build/document
- Course information on ECE Website
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;
- streams allow you to mix and match as you wish and provide larger number of courses to choose from;
- options are limiting.
CE Streams

Streams of Specialization for Elective Courses in Computer Engineering

• Computer Hardware
• Computer Systems
• Software Engineering
• Mechatronics
• Artificial Intelligence
Electrical Engineering

• 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 credits for the complete program.
ELEC Program Core in Third Year

**FALL**
- ELEC 324 Discrete-Time Signals & Systems
- ELEC 353 Electronics II
- ELEC 371 Microprocessor Interfacing ...

**WINTER**
- ELEC 372 Numerical Methods & Optim.
- ELEC 381 Applications of Electromagnetics
- ELEC 390 ECE Design
- ENPH 336 Solid State Devices

1 Technical Elective Course (any term)
Complementary Studies (F/W/S)
non-ECEi: APSC 221 Economics… (F/W/S)

**COMM 301 Launching New Ventures (ECEi)**

**COMM 302 Funding New Ventures (ECEi)**
Electrical Engineering Electives

**Electives List A**
- ELEC 270 Discrete Mathematics with CompEng. Applications
- ELEC 279 Introduction to Object Oriented Programming
- ELEC 333 Electric Machines
- ELEC 344 Sensors and Actuators
- ELEC 373 Computer Networks
- ELEC 374 Digital Systems Engineering
- ELEC 422 Digital Signal Processing...
- ELEC 425 Machine Learning and Deep Learning
- ELEC 431 Power Electronics
- ELEC 433 Energy and Power Systems
- ELEC 443 Linear Control Systems
- ELEC 448 Introduction to Robotics: Mechanics and Control
- ELEC 457 Integrated Circuits and System Applications
- ELEC 464 Wireless Communications
- ELEC 470 Computer System Architecture
- ELEC 472 Artificial Intelligence and Interactive Systems
- ELEC 473 Cryptography and Network Security
- ELEC 481 Applications of Photonics
- ELEC 483 Microwave and RF Circuits and Systems
- ELEC 497 Research Project

**Electives List B**
- APSC 303 Professional Internship
- APSC 400 Technology, Engineering & Management (TEAM)
- 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 Introduction to Operations Research Models
- MTHE 367 Engineering Data Analysis
- MTHE 430 Modern Control Theory
- MTHE 455 Stochastic Processes and Applications
- MTHE 472 Control of Stochastic Systems
- MTHE 474 Information Theory
- MTHE 477 Data Compression and Source Coding
- 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 Manufacturing
- MECH 465 Computer-Aided Design
- MECH 478 Biomaterials
- MECH 494 Kinematics of Human Motion
- MINE 472 Mining Systems, Automation, and Robotics
EE Streams

Streams of Specialization for Elective Courses in Electrical Engineering

• Biomedical Engineering
• Communications & Signal Processing
• Communications Systems & Networks
• Electronics & Photonics
• Mechatronics
• Power Electronics & Systems
• Robotics and Control
Complementary Studies – not innovation stream

- **must** have a total of 9 credits (108 units) of CS:
  - **3 credits** must be from List A (Humanities and Social Sciences);
  - **6 credits** from List B (other);

- Typically take 1 CS course in each of 2nd, 3rd, 4th 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).
<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Year</td>
<td>COMM 201 - Introduction to Business for Entrepreneurs – F</td>
</tr>
<tr>
<td>3rd Year</td>
<td>COMM 301 - Funding New Ventures – F (also available online in S2022)</td>
</tr>
<tr>
<td></td>
<td>COMM 302 - Launching New Ventures – W</td>
</tr>
<tr>
<td></td>
<td>List “A” Complementary Studies Course – F/W/S</td>
</tr>
<tr>
<td>4th Year</td>
<td>COMM 405 – New Business Development - F</td>
</tr>
</tbody>
</table>

ECEi: No reduction in technical content
For **2022-2023**, some electives *not* offered (planned alternation or instructor unavailable):

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ELEC 408</td>
<td>Biomed. Image</td>
</tr>
<tr>
<td>ELEC 409</td>
<td>Bioinformatic Analytics</td>
</tr>
<tr>
<td>ELEC 421</td>
<td>Digital Signal Processing: Filters and System Design</td>
</tr>
<tr>
<td>ELEC 436</td>
<td>Electric Machines and Control</td>
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<tr>
<td>ELEC 444</td>
<td>Modeling &amp; Comp. Control of Mech. Syst.</td>
</tr>
<tr>
<td>ELEC 451</td>
<td>Digital Integrated Circuit Engineering</td>
</tr>
<tr>
<td>ELEC 454</td>
<td>Analog Electronics</td>
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<td>ELEC 461</td>
<td>Digital Communications</td>
</tr>
<tr>
<td>ELEC 474</td>
<td>Machine Vision</td>
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<tr>
<td>ELEC 486</td>
<td>Fiber Optic Communications</td>
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## 2022-2023 ECE Technical Electives

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<tr>
<th>Fall</th>
<th>Winter</th>
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<td><strong>ELEC 344</strong> Sensors and Actuators</td>
<td><strong>ELEC 333</strong> Electric Machines</td>
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<tr>
<td><strong>ELEC 422</strong> Dig. Signal Proc.: Random models</td>
<td><strong>ELEC 433</strong> Energy and Power Systems</td>
</tr>
<tr>
<td><strong>ELEC 425</strong> Machine Learning and Deep Learning</td>
<td><strong>ELEC 457</strong> Analog Integrated Circuits and Systems</td>
</tr>
<tr>
<td><strong>ELEC 431</strong> Power Electronics</td>
<td><strong>ELEC 464</strong> Wireless Communications</td>
</tr>
<tr>
<td><strong>ELEC 443</strong> Control Systems I</td>
<td><strong>ELEC 470</strong> Computer System Architecture</td>
</tr>
<tr>
<td><strong>ELEC 448</strong> Intr. Robotics: Mechanics &amp; Control</td>
<td><strong>ELEC 472</strong> Artificial Intelligence</td>
</tr>
<tr>
<td><strong>ELEC 473</strong> Cryptography and Network Security</td>
<td><strong>ELEC 483</strong> Microwave and RF Circuits &amp; Systems</td>
</tr>
<tr>
<td><strong>ELEC 481</strong> Applications of Photonics</td>
<td><strong>SOFT 423</strong> S/W Requirements</td>
</tr>
<tr>
<td><strong>SOFT 437</strong> Performance Analysis</td>
<td></td>
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## 2022-2023 CMPE Technical Electives

<table>
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<th>Fall</th>
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<td>CMPE 204 Logic for Computing Science</td>
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<td>CMPE 251 Data Analytics</td>
<td>CMPE 223 Software Specifications</td>
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<td>CMPE 454 Comp. Graphics</td>
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<td>CMPE 457 Image Processing &amp; Comp. Vision</td>
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<td></td>
<td>CMPE 458 Program. Language Processors</td>
</tr>
</tbody>
</table>
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)

• Respect deadlines to avoid difficulties (Add/Drop courses)
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): CMPE 452

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.)
1. Send an email to the Undergraduate Program Assistant (UPA - Irina or Alisa) 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) COMP Courses: No instructor signature required.

3. UPA will submit the course substitution material(s) to the Undergraduate Program Chair for review. The Undergraduate 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).
• 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.
• 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 Registration

- July 18th – Course Selection begins
- Sept 6: Classes begin
- Sept 19 – Last day to add courses
- October 11-14 – Fall Term Break

- Sessional Dates 2022-2023

https://www.queensu.ca/registrar/resources/sessional-dates
The **Career Services** office is always available to help (Career fair, Engineering & technology fair, summer job fair).

### 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; *LIST_B in EE & LIST_C in CE*).
- 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.

Planning for 3rd & 4th Year

Program spreadsheet demo