Faculty of Engineering and Applied Science

Department of Electrical and Computer Engineering

Information Slides to prepare for the 2022-2023 Academic Year

April 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

Booking an appointment with the UG Assistant
1. **FEAS**
   - Academic Calendar, [Academic Plans](#) and course information;
   - FEAS Policies and Regulations;
   - **FORMS**: Substitution request, Incomplete Grade request, Late Course Add/Drop requests, Waivers etc.;
   - Student services resources: academic considerations, accommodations, embedded counsellors, dual degree, supplemental exam, awards etc.).

2. **ECE**
   - [ECE Degree Planning Spreadsheets](#)
   - [ELEC Course Information](#)
   - [ECE Faculty](#)
   - [Booking an appointment with the advisor](#)
REGULAR STREAM:
ELEC 490/8 Capstone project course (Fall-Winter), 7 credits

INNOVATION STREAM:
ELEC 490/8 – Capstone project course (Fall-Winter), 7 credits
COMM 405 New Business Development - Fall

Notes:
• All fourth-year ECE students who have completed the necessary prerequisite courses will be automatically preloaded into the ELEC 490/498 design project course, depending on their program.
• You can also self-register in ELEC490/8, or contact your UG Assistant for help.
• ELEC 490/8 group building and project assignments will begin in August; students will be contacted by the course Graduate TAs to work on/confirm group/project information.
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.

Note!

There is a change in the graduation requirement, Spring 2023: CE students need to complete 3 elective courses with ED/ES qualified units (i.e., a course with a P.Eng. or EIT instructor).
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;
Computer Engineering
Electives

**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 NOT OFFERED Biomed. Signal & Image Processing
- ELEC 409 NOT OFFERED Bioinformatic Analytics
- ELEC 421 NOT OFFERED 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 NOT OFFERED Comp. Control of Mechatronic Syst.
- ELEC 448 Introduction to Robotics: Mechanics and Control
- ELEC 461 NOT OFFERED Digital Communications
- ELEC 464 Wireless Communications
- ELEC 470 Computer System Architecture
- ELEC 472 Artificial Intelligence and Interactive Systems
- ELEC 473 Cryptography and Network Security
- ELEC 474 NOT OFFERED Machine Vision
- ELEC 497 Research Project

**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

SOFT 423 Software Requirements
SOFT 437 Performance Analysis
### Electives: P.Eng. and EIT (2022-2023 AY)

#### LIST A

<table>
<thead>
<tr>
<th>COURSE</th>
<th>P.ENG</th>
<th>TERM</th>
<th>CREDITS</th>
<th>PREREQUISITES</th>
<th>EXCLUSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 224: Continuous-Time Sig&amp;Sys</td>
<td>P.Eng</td>
<td>W</td>
<td>3.75</td>
<td>ELEC 221, MTHE 235</td>
<td></td>
</tr>
<tr>
<td>ELEC 324: Discrete-Time Sig&amp;Sys</td>
<td>P.Eng</td>
<td>F</td>
<td>4</td>
<td>ELEC 323 or ELEC 224</td>
<td></td>
</tr>
<tr>
<td>ELEC 344: Sensors and Actuators</td>
<td>F</td>
<td>3.75</td>
<td>ELEC 221, ELEC 271, ELEC 299, ELEC 252</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC 353: Electronics II</td>
<td>P.Eng</td>
<td>F</td>
<td>4.25</td>
<td>ELEC 252</td>
<td></td>
</tr>
<tr>
<td>ELEC 372: Numerical Methods &amp; Optim</td>
<td>P.Eng</td>
<td>W</td>
<td>3.5</td>
<td>APSC 142 or APSC 143 or MNTC 313, APSC 174, MTHE 235</td>
<td></td>
</tr>
<tr>
<td>ELEC 408: Biomedical Signal &amp; Image</td>
<td>N/O</td>
<td>N/O</td>
<td>3</td>
<td>COREQ: ELEC 323</td>
<td></td>
</tr>
<tr>
<td>ELEC 409: Bioinformatic Analytics</td>
<td>N/O</td>
<td>N/O</td>
<td>3</td>
<td>APSC 174, ELEC 224 or ELEC 323, ELEC 326</td>
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</tr>
<tr>
<td>ELEC 421: DSP: Filters &amp; Sys Design</td>
<td>N/O</td>
<td>N/O</td>
<td>4</td>
<td>ELEC 323 and ELEC 324</td>
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</tr>
<tr>
<td>ELEC 422: DSP: Random Mod &amp; Appl</td>
<td>F</td>
<td>3.5</td>
<td>ELEC 324, ELEC 326</td>
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<td></td>
</tr>
<tr>
<td>ELEC 425: Machine Learning &amp; Deep Learning</td>
<td>EIT</td>
<td>F</td>
<td>3.5</td>
<td>ELEC 278, ELEC 326</td>
<td>CMPE 452</td>
</tr>
<tr>
<td>ELEC 431: Power Electronics</td>
<td>P.Eng</td>
<td>F</td>
<td>3.25</td>
<td>ELEC 252</td>
<td></td>
</tr>
<tr>
<td>ELEC 443: Control Systems I</td>
<td>P.Eng</td>
<td>F</td>
<td>4.25</td>
<td>ELEC 323 or ELEC 224</td>
<td></td>
</tr>
<tr>
<td>ELEC 444: Modelling &amp; Comp Control</td>
<td>N/O</td>
<td>N/O</td>
<td>3.25</td>
<td>ELEC 324, ELEC 344, ELEC 443</td>
<td></td>
</tr>
<tr>
<td>ELEC 448: Introduction to Robotics</td>
<td>P.Eng</td>
<td>F</td>
<td>3.5</td>
<td>ELEC 443 as a prereq OR co-req</td>
<td>MECH 456</td>
</tr>
<tr>
<td>ELEC 461: Digital Communications</td>
<td>N/O</td>
<td>N/O</td>
<td>3.5</td>
<td>ELEC 324, ELEC 326</td>
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<tr>
<td>ELEC 464: Wireless Communications</td>
<td>P.Eng</td>
<td>F</td>
<td>3</td>
<td>ELEC 323, ELEC 324, ELEC 326</td>
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<tr>
<td>ELEC 470: Comp. Sys. Architecture</td>
<td>W</td>
<td>3.5</td>
<td>ELEC 371, ELEC 274</td>
<td></td>
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</tr>
<tr>
<td>ELEC 472: Artificial Intelligence</td>
<td>P.Eng</td>
<td>W</td>
<td>3.5</td>
<td>ELEC 278, ELEC 326</td>
<td></td>
</tr>
<tr>
<td>ELEC 473: Cryography and Network Security</td>
<td>F</td>
<td>3</td>
<td>ELEC 373, ELEC 270</td>
<td></td>
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<tr>
<td>ELEC 474: Machine Vision</td>
<td>N/O</td>
<td>N/O</td>
<td>3.5</td>
<td>ELEC 278 or CISC 235</td>
<td>CMPE 457</td>
</tr>
<tr>
<td>ELEC 497: Research Project</td>
<td>TBD</td>
<td>FW/S</td>
<td>3.5</td>
<td>ELEC 491</td>
<td></td>
</tr>
<tr>
<td>SOFT 423: Software Requirements</td>
<td>W</td>
<td>3</td>
<td>CMPE 223, and CMPE 322 as a co-req</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOFT 437: Performance Analysis</td>
<td>P.Eng</td>
<td>F</td>
<td>3</td>
<td>ELEC 377</td>
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</tbody>
</table>

#### LIST B

<table>
<thead>
<tr>
<th>COURSE</th>
<th>P.ENG</th>
<th>TERM</th>
<th>CREDITS</th>
<th>PREREQUISITES</th>
<th>EXCLUSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMPE 452: Neural &amp; Genetic Comp.</td>
<td>P.Eng</td>
<td>F</td>
<td>3</td>
<td>ELEC 278</td>
<td>ELEC 425</td>
</tr>
</tbody>
</table>

#### List C

<table>
<thead>
<tr>
<th>COURSE</th>
<th>P.ENG</th>
<th>TERM</th>
<th>CREDITS</th>
<th>PREREQUISITES</th>
<th>EXCLUSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>APSC 401: Interdisciplinary Projects</td>
<td>TBD</td>
<td>W</td>
<td>4.5</td>
<td></td>
<td>APSC 400, APSC 381</td>
</tr>
</tbody>
</table>
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.
## 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 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
Complementary Studies – not Innovation stream

All fourth-year ECE must normally include one complementary studies elective, unless they have already fulfilled the complementary studies requirements with approved credits for courses taken earlier at Queen's University or elsewhere (a total of 108 AU's or 9 credits of Complementary Studies electives must be taken).

➢ must have a total of 9 credits (108 units) of CS:
  o 3 credits must be from List A (Humanities and Social Sciences)
  o The remaining 6 credits can be from List A or List B
## Innovation Stream: Business & Complementary Studies

<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</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>
For **2022-2023**, some electives *not* offered:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<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 422</td>
<td>Digital Signal Processing: Random Models and Applications</td>
</tr>
<tr>
<td>ELEC 436</td>
<td>Electric Machines and Control</td>
</tr>
<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>
</tr>
<tr>
<td>ELEC 461</td>
<td>Digital Communications</td>
</tr>
<tr>
<td>ELEC 474</td>
<td>Machine Vision <em>(consider CMPE 457 (W) instead)</em></td>
</tr>
<tr>
<td>ELEC 486</td>
<td>Fiber Optic Communications</td>
</tr>
</tbody>
</table>
### Technical Electives

#### 2022-2023 ECE Technical Electives *per term*

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

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</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</td>
</tr>
<tr>
<td>CMPE 320 Fundamentals of Soft. Dev.</td>
<td>CMPE 322 Software Architecture</td>
</tr>
<tr>
<td>CMPE 327 Software Quality Assurance</td>
<td>CMPE 325 Human-Computer Interaction</td>
</tr>
<tr>
<td>CMPE 330 Computer-Integrated Surgery</td>
<td>CMPE 332 Database Management Systems</td>
</tr>
<tr>
<td>CMPE 422 Formal Methods in Soft. Eng.</td>
<td>CMPE 351 Advanced Data Analytics</td>
</tr>
<tr>
<td>CMPE 452 Neural and Genetic Computing</td>
<td>CMPE 454 Comp. Graphics</td>
</tr>
<tr>
<td></td>
<td>CMPE 457 Image Processing &amp; Comp. Vision</td>
</tr>
<tr>
<td></td>
<td>CMPE 458 Program. Language Processors</td>
</tr>
</tbody>
</table>
Queen’s University Internship Program (QUIP): 

• The QUIP courses count towards your Professional Internship Designation and towards your Degree Requirements.

• Your diploma will read: Bachelor of Applied Science, with Professional Internship.

• APSC 303 - 3.5 academic credits will be applied towards...
  • Computer Engineering accepts APSC 303 as a technical elective List C
  • Electrical Engineering accepts APSC 303 as a technical elective List B
• Use your degree planning spreadsheet to verify that all program requirements will be met - *the ECE updated spreadsheets will be available in May*

• 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)
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.)
Substitutions: Process

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) Complementary Studies 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: 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).
Course Planning

• Not all electives offered every year. Some 400 level courses will not be offered the following year

• APSC 221 F/W/S (not for ECEi)

• Project Design courses (ex., APSC 381, APSC 401) have its own application process. Check with the course administrator to learn about the registration process and requirements.

• 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.
• 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