

SENATE UNDERGRAD COUNCIL

TUESDAY 21 NOVEMBER 2023

12:30 P.M. EST

NH 3318 / Zoom

[Governing Documents and Resources](#)

| TIMING | AGENDA ITEM | PAGE | ACTION |
|-------------------------|--|------|---|
| | OPEN SESSION | | |
| 12:30 p.m. (5 mins) | 1. Conflict of Interest | 3 | Declaration |
| | 2. Minutes of 17 October 2023 Meeting | 4 | Decision (SUC) |
| | 3. Business Arising from the Minutes | Oral | Input |
| | a. Curriculum Subcommittee | Oral | Information |
| | Consent Agenda | | |
| | <i>Motion: To approve the items on the consent agenda, listed as items 4 a-g below.</i> | | |
| | 4. Curricular Submissions | 6 | |
| | a. Faculties of Arts and Environment (Johanna Wandel) | 7 | Decision (SUC) |
| | b. Faculty of Engineering (Jason Grove) | 10 | Decision (SUC) |
| | c. Faculty of Environment (Johanna Wandel) | 90 | Decision (SUC) |
| | d. Faculty of Health (Leeann Ferries) | 134 | Decision (SUC) |
| | e. Faculty of Mathematics (Cecilia Cotton) | 143 | Decision (SUC) |
| | f. Software Engineering (Jason Grove) | 154 | Decision (SUC) |
| | Regular Agenda | | |
| 12:35 p.m. (10 mins) | 5. Academic Program Reviews | | |
| | a. Progress Report: Global Business and Digital Arts, and Digital Experience Innovation (Jessica Thompson) | 157 | Decision (SUC) |
| 12:45 p.m. (20 mins) | 6. Curricular Submissions | 169 | |
| | a. Faculty of Engineering (Jason Grove) | 170 | Decision (SEN-R) |
| | b. Faculty of Environment (Johanna Wandel) | 186 | Decision (4, 5 & 12 SEN-R, rest SEN-C) |
| | c. Student Success Office (Sacha Geer, Sandra Lopez-Rocha, & Pam Charbonneau) | 197 | Decision (SEN-R) |
| 1:05 p.m. (10 mins) | 7. Registrar's Office | | |
| | a. Academic Considerations and Accommodations Report (Jennifer Coghlin) | 200 | Decision (SEN-C) |
| 1:15 p.m. (10 mins) | 8. Revisions to the Institutional Quality Assurance Process (Angela Christelis) | 219 | Decision (SUC) |

| TIMING | AGENDA ITEM | PAGE | ACTION |
|------------------------|--|------|-------------|
| 1:25 p.m. (45 mins) | 9. Evidence Based Teaching (Kyle Scholz & Anne Fannon) | Oral | Information |
| | 10. Other Business | Oral | Input |
| | 11. Adjournment | Oral | Input |

“Decision (SUC)” to be approved on behalf of Senate

“Decision (SEN-C)” to be recommended to Senate for approval (consent agenda)

“Decision (SEN-R)” to be recommended to Senate for approval (regular agenda)

15 November 2023

Tim Weber-Kraljevski
Governance Officer
Secretary to SUC

Important Dates

27 November 2023 Senate Meeting

29 January 2024 Senate Meeting

5 February 2024 SUC Meeting

4 March 2024 Senate Meeting

8 March 2024 SUC Meeting

8 April 2024 Senate Meeting

Excerpt from Senate Bylaw 1

8. Declarations of conflict of interest

| | |
|------|---|
| 8.01 | At the beginning of each meeting of Senate or any of Senate’s committees or councils, the chair will call for members to declare any conflicts of interest with regard to any agenda item. For agenda items to be discussed in closed session, the chair will call for declarations of conflict of interest at the beginning of the closed portion of the meeting. Members may nonetheless declare conflicts at any time during a meeting. |
| 8.02 | A member shall be considered to have an actual, perceived or potential conflict of interest, when the opportunity exists for the member to use confidential information gained as a member of Senate, or any of Senate’s committees or councils, for the personal profit or advantage of any person, or use the authority, knowledge or influence of the Senate, or a committee or council thereof, to further her/his personal, familial or corporate interests or the interests of an employee of the university with whom the member has a marital, familial or sexual relationship. |
| 8.03 | Members who declare conflicts of interest shall not enter into debate nor vote upon the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s). |
| 8.04 | Where Senate or a committee or council of Senate is of the opinion that a conflict of interest exists that has not been declared, the body may declare by a resolution carried by two-thirds of its members present at the meeting that a conflict of interest exists and a member thus found to be in conflict shall not enter into debate on the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s). |

University of Waterloo
SENATE UNDERGRADUATE COUNCIL
Minutes of the 17 October 2023 Meeting
[in agenda order]

Present: Katherine Acheson, Janice Aurini, Logan Baston, Victoria Chu, Cecilia Cotton, Vivian Dayeh, Laura Deakin, David DeVidi (chair), Leeann Ferries, Jason Grove, Fatma Gzara, Alysia Kolentsis, Carol Ann MacGregor, Kristiina Montero, Rory Norris, Chris Vigna, Johanna Wandel, Tim Weber-Kraljevski (secretary), Richard Wikkerink.

Resources/Guests: Angela Christelis, Jennifer Coghlin, Michael Collins (4a), Mario Coniglio (4e), Brenda Denomme, Blare Cressman, Heather Henderson (4d), Maysah Eid, Carrie MacKinnon, Kyle Scholz, James Skidmore (4c), Mark Vuorinen (4b).

Absent: Viv Hoang, Grace Marshall, Catherine Newell Kelly*, Isaac Ocampo, Charvi Patel, Theodore Thompson, Ryan Trelford.
*regrets

Organization of Meeting: David DeVidi took the chair, and Tim Weber-Kraljevski acted as secretary. The secretary advised that a quorum was present. The agenda was approved without formal motion.

1. CONFLICT OF INTEREST

No conflicts of interest were declared.

2. MINUTES OF THE 19 SEPTEMBER 2023 MEETING

The minutes were approved without formal motions.

3. BUSINESS ARISING FROM THE MINUTES

There was no business arising.

4. ACADEMIC PROGRAM REVIEW

a. Final Assessment Report: Mechanical Engineering, Mechatronics Engineering, and Mechatronics

Micheal Collins provided a brief overview of the report. Members discussed: the challenges of diversity and gender equity; mandatory coop requirements for the program; interdisciplinarity and cross-departmental capstone projects; and the need for all programs to examine requirements to allow for more flexible pathways. Collins left the meeting.

b. Final Assessment Report: Music, Intensive Music Specialization, and Church Music and Worship

Mark Vuorinen provided a brief overview of the report. Members discussed: the impact on the closing of the KW Symphony; and the collaborations the program is pursuing. Vuorinen left the meeting.

c. Final Assessment Report: German, Russian and East European Studies, and Cultural Identities

James Skidmore provided a brief overview of the report. Members discussed: the faculty reorganization being considered in the Faculty of Arts. Skidmore left the meeting.

d. Progress Report: Human Resources Management

Heather Henderson provided a brief overview of the report. Members discussed: possibility of expanding the program; and the advantages and limitations of using sessional lecturers who are professional within the field. Henderson left the meeting.

e. Progress Report: Earth Sciences and Environmental Sciences

Mario Coniglio provided a brief overview of the report. There was no discussion from members. Coniglio left the meeting.

Members discussed: language studies at Waterloo; and recommending the Earth Sciences and Environmental Sciences update the details on recommendation 4 to reflect the online courses that were actual offered. A motion was heard to approve the following reports on behalf of Senate: Mechanical Engineering, Mechatronics Engineering, and Mechatronics; Music, Intensive Music Specialization, and Church Music and Worship; German, Russian and East European Studies, and Cultural Identities; Human Resources Management; and Earth Sciences and Environmental Sciences. Wandel and Deakon. Carried.

5. REGISTRAR'S OFFICE

New Undergraduate Scholarships, Awards, And Bursaries: This item was received for information. Members discussed: mixed language across awards for gender identity; the rationale for the Ted Rogers Undergraduate Indigenous Student Award not having a note that the award description will not be added to database; and the need for Management Sciences to be updated to Management Science and Engineering within the database.

Academic Calendar Dates 2024/25: Jennifer Coghlin provided an overview of the material provided. A motion was heard to recommend Senate approve the 2024-2025 academic calendar dates and calendar guidelines for establishing academic dates, as presented. Grove and Deaken. Carried.

6. TEACHING INCUBATOR PROJECTS PROGRESS UPDATE

Kyle Scholz presented on the Teaching Innovation Incubator (TII), providing an overview TII and an update on five TII Beta Projects, focusing on Accessible Education and Adapting Student-Led Individually Created Courses (SLICCS) to Encourage Self-Directed Learning. Members discussed: the organization of the TII, resources available through TII, and the process being developed for getting projects into TII.

7. OTHER BUSINESS

Subcommittee: The chair provided the following updates on the Curriculum Subcommittee: the proposal went to Senate Executive Council (SEC) and is now going to Senate for endorsement; SEC suggested that the student representative on the subcommittee should be the executive member appointed by WUSA on Council, who is currently Rorry Norris, as they would have a large breath of knowledge and represent students in their entirety instead of a particular faculty; and the AFIWs have selected Alysia Kolentsis to serve as the AFIW representation on the subcommittee for the pilot.

Members discussed: Final Assessment Reports for programs that are co-managed by a university faculty and an AFIW, and for Quality Assurance to create a template for the faculty and AFIW to have a conversation at the beginning of the program review process to set expectations for involvement in the review process and for addressing the recommendations.

8. ADJOURNMENT

With no further business, the meeting adjourned. The next meeting is Tuesday, 21 November 2023, 12:30 to 2:30 p.m. in NH 3318.

13 November 2023

Tim Weber-Kraljevski
Governance Officer

For Approval**Consent Agenda****Open Session**

To: **Senate Undergraduate Committee**

Sponsor: David DeVidi, Associate Vice-President, Academic
Contact Information: david.devidi@uwaterloo.ca

Presenter: David DeVidi, Associate Vice-President, Academic
Contact Information: david.devidi@uwaterloo.ca

Date of Meeting: **November 21, 2023**

Agenda Item Identification: **Approval of Curricular Items on Behalf of Senate**

Recommendation/Motion:

To approve the following curricular items on behalf of Senate, as presented.

Summary:

The SUC Curriculum met on November 15, 2023 to review and discuss curricular submissions, and agreed to forward the following items, included in the appendices of this report, to SUC for approval as part of the consent agenda. These items include minor plan changes, new courses, course changes, and course inactivations for: the Faculties of Arts and Environment; the Faculty of Engineering; the Faculty of Environment; the Faculty of Health; the Faculty of Mathematics; and Software Engineering.

Documents Included:

- Appendix A: Faculties of Arts and Environment
- Appendix B: Faculty of Engineering
- Appendix C: Faculty of Environment
- Appendix D: Faculty of Health
- Appendix E: Faculty of Mathematics
- Appendix F: Software Engineering

Appendix A: Faculties of Arts and Environment

**Senate Undergrad Council
Faculty of Environment and Faculty of Arts
November 21, 2023**

For Approval:

Academic Plan changes (minor):

1. Sustainability and Financial Management Honours (attachment 1)

Sustainability and Financial Management, Honours: Revisions

Revision 1:

Retroactive Effective date: September 2022 (approval for the retroactive effective date has been granted by the R/O. Live calendars for 2022/23 and 2023/24 to be updated.)

Rationale: Replace ENV5 201 with AFM 335. After the curriculum review by the Chartered Professional Accountants (CPA) it was determined that ENV5 201 does not sufficiently cover the business law competencies required for accreditation by the association. AFM 335 is the course offered in the AFM program which meets the business law accreditation requirements. Changes have been approved by both Environment and Arts and is being forwarded as a joint submission.

ENV Governance:

UGSC – July 19, 2023

FC – September 14, 2023

ARTS Governance:

UGAG – April 6, 2023

AFC – May 16, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)
Successful completion of the following 12.5 academic course units:

- AFM 112, AFM 113, AFM 121, AFM 182, AFM 191, AFM 205 (0.25 unit), AFM 208 (0.25 unit), AFM 244, AFM 273, AFM 274, AFM 291, **AFM 335**, AFM 373, AFM 391
- SFM 101, SFM 102, SFM 201, SFM 301, SFM 309
- ENBUS 202
- ENV5 200, ~~ENV5 201~~, ENV5 205
- GEOG 207
- AFM 433 or ENBUS 302
- AFM 111, ENV5 131 (see Note)

Revision 2:

Retroactive Effective date: September 2023 (approval for the retroactive effective date has been granted by the R/O. Live calendar for 2023/24 to be updated.)

Rationale: Replace ENV5 205 with ENV5 195. ENV5 195 is better suited to the learning outcomes of the BSFM program, introducing environmental studies which was previously absent. The change will also alleviate issues with overlapping content in ENV5 205 and SFM 101 (both of which are currently degree required courses). Changes have been approved by Environment and Arts. This item is being forwarded as a joint submission.

ENV Governance:

UGSC – July 19, 2023

FC – September 14, 2023

ARTS Governance:
UGAG – April 6, 2023
AFC – May 16, 2023

Successful completion of the following 12.5 academic course units:

- AFM 112, AFM 113, AFM 121, AFM 182, AFM 191, AFM 205 (0.25 unit), AFM 208 (0.25 unit), AFM 244, AFM 273, AFM 274, AFM 291, AFM 335, AFM 373, AFM 391
- SFM 101, SFM 102, SFM 201, SFM 301, SFM 309
- ENBUS 202
- **ENVS 195**, ENVS 200, ~~ENVS 205~~
- GEOG 207
- AFM 433 or ENBUS 302
- AFM 111, ENVS 131 (see Note)

WATERLOO | ENGINEERING

Engineering Undergraduate Office

MEMORANDUM

November 21, 2023

TO: Tim Weber-Kraljevski, Associate University Secretary, Secretariat

FROM: Jason Grove, Associate Dean, Undergraduate Studies, Faculty of Engineering

SUBJECT: Items for Approval at November 21, 2023 Senate Undergraduate Council

ALL CHANGES ARE EFFECTIVE SEPTEMBER 2024 UNLESS OTHERWISE NOTED.

- 1. New Courses** [for approval]
 - 1.1 Biomedical Engineering (BME 400, 544)
 - 1.2 Chemical Engineering (CHE 560)
 - 1.3 Conrad School of Entre. & Business (BET 405)
 - 1.4 Computer and Electrical Engineering (ECE 305, 405A, 405B, 405C, 405D)
 - 1.5 Mechatronics Engineering (MTE 182, MTE 252, MTE 351, MTE 352, MTE 484)
 - 1.6 Nanotechnology Engineering (NE 380L)
 - 1.7 Systems Design Engineering (SYDE 300)

- 2. Course Changes** [for approval]
 - 2.1 Architectural Engineering (AE 100, 125, 200, 225, 300, 325, 405)
 - 2.2 Chemical Engineering (CHE 561)
 - 2.3 Civil Engineering (CIVE 332, 460, 596)
 - 2.4 Computer and Electrical Engineering (ECE 124, 203, 222, 224, 252, 320, 327, 350, 351, 356, 406, 409, 414, 423, 451, 452, 453, 454, 455, 457A, 457B, 458, 459, 484, 498A)
 - 2.5 Management Engineering (MSCI 332)
 - 2.6 Mechanical Engineering (ME 321, ME 351, ME 571)
 - 2.7 Mechatronics Engineering (MTE 120, 262, 325)
 - 2.8 Nanotechnology Engineering (NE 281, 481, 488)
 - 2.9 Systems Design Engineering (SYDE 182, 252, 262, 312, 351, 411, 532)

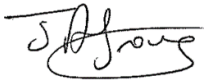
- 3. Course In-activations** [for approval]
 - 3.1 Computer and Electrical Engineering (ECE 103, 155, 204A, 204B, 242, 254, 361, 405)

4. Academic Plans

[for approval]

- 4.1 School of Architecture
- 4.2 Architecture Engineering
- 4.3 Biomedical Engineering
- 4.4 Chemical Engineering
- 4.5 Civil Engineering
- 4.6 Computer Engineering
- 4.7 Electrical Engineering
- 4.8 Environmental Engineering
- 4.9 Geological Engineering
- 4.10 Management Engineering
- 4.11 Mechanical Engineering
- 4.12 Mechatronics Engineering
- 4.13 Nanotechnology Engineering
- 4.14 Systems Design Engineering

Secretary Note: Major Modifications in Items 4.6, 4.7, and 4.13 are for consideration as part of the regular agenda.



Jason Grove
Associate Dean, Undergraduate Studies
Faculty of Engineering

NEW COURSES (for approval)

1.1 Biomedical Engineering

Effective 01-SEP-2024

BME 400 (0.13) PRJ, SEM Work-term Symposium Poster

Short title: Symposium Poster

A work-term poster is composed and presented at the symposium. The poster and presentation provide an opportunity for students to effectively communicate and reflect on their engineering experience gained during their co-op work terms. In the poster and presentation, students draw connections between the theoretical aspects of engineering taught in the classroom and the practical applications of that theory in the workplace. [Offered: F, first Offered: Fall 2025].

Note: this course is considered as DRNA

Requisites : Prereq: PD11; Level at least 4A Biomedical Engineering.
Antireq: WKRPT 400, 401

Rationale : Biomedical Engineering is replacing the 3 work-term reports with two new requirements (Work-term symposium poster and PD 11). This will reduce the workload on students and provide opportunity to expand on their communication skills. The poster symposium allows students to reflect on their cooperative work-term experiences both from a lifelong and technical experience perspective and share with the broader community through a symposium held in 4A.

Effective 01-SEP-2024

BME 544 (0.50) LEC, TUT Biomedical Measurement and Signal Processing

Short title: Measurement & Signal Processing

This course develops an understanding of biomedical measurements through the examination of electromyographic (EMG), electroencephalographic (EEG), and electrocardiographic (ECG) signals. Measurement of human-body position, force, and pressure, and related instrumentation will also be presented. Signal processing techniques will be discussed in the context of extraction and application of useful biomedical signals. [Offered: W, first offered Winter 2025]

Requisites : Prereq: One of BIOL 273, BME 284, SYDE 384/584; Level at least 3A
Biomedical Engineering or Level at least 3B Systems Design Engineering or Level at least 3B Honours Life Physics (Biophysics Specialization)
Antireq: SYDE 544

Rationale : This course was previously under a SYDE course code. This topic and content of the course aligns better with the biomedical undergraduate curriculum and teaching tasks and is complementary to our current suite of BME technical electives.

1.2 Chemical Engineering

Effective 01-SEP-2024

CHE 560 (0.50) LEC Nanomedicine and Nanobiotechnology

Short title: Nanomedicine & Nanobiotechnology

Overview of biomedical engineering principles. Formulation and manufacturing processes for production of nanoparticles for medical applications. Pharmacokinetics, toxicity, and human physiology in drug administration. Route of administration and controlled delivery strategies. Formulation and manufacturing process for drug delivery in the biotechnology and pharmaceutical industries.

Requisites : Prereq: Level at least 4A Biomedical Engineering or Chemical Engineering
(Cross-listed with NE 481)

Rationale : This course is equivalent to NE 481 which is an elective course taken by many chemical students and is highly relevant to chemical engineering. Chemical students are required to take 4 technical electives, two of which must be CHE 5XX. Creating this course allows chemical students to take this course as one of the required 5XX technical electives, giving them more flexibility.

1.3 Conrad School of Entrepreneurship and Business

Effective 01-SEP-2024

BET 405 (0.50) LEC Digital Leadership and Transformation
Short title: Digital Transformation

Firms must continuously evolve and adapt in rapidly changing competitive environments. While investments in new technology are important, this is not the only aspect of successful digital transformation. It requires an understanding of the implications for the firm's products and services as well as its business model, culture, and operations. In this course we examine some of the implications for organizations as they continuously evolve and transform themselves to become and remain responsive and competitive.

Requisites :

Rationale : This course is a holistic look at the strategy and processes organizations need to consider when embarking on digital transformations within organizations. Firms must continuously evolve and adapt in rapidly changing competitive environments. While investments in new technology are important, this is not the only aspect of successful digital transformation. It requires an understanding of the implications for the firm's products and services as well as its business model, culture, and operations. This course will examine some of the implications for organizations as they continuously evolve and transform themselves to become and remain responsive and competitive. This new course will not affect any student currently working towards either the minor or option in Entrepreneurship except that it will make available a new elective.

1.4 Electrical & Computer Engineering

Effective 01-SEP-2024

ECE 305 (0.50) LEC, TUT Introduction to Quantum Mechanics
Short Title: Intro Quantum Mechanics

Introduction to quantization, wave-particle duality, and the uncertainty principle. The Schroedinger equation and solvable examples. Topics include stationary states of particle-in-a-box, harmonic oscillator, and the hydrogen atom. Quantization of angular momentum and spin. Introduction to approximation methods including time-independent perturbation theory. Modern applications of quantum mechanics.

Requisites : Prereq: (ECE 105, 106, (ECE 205/MATH 211 or MATH 213)) or Quantum Engineering Option students
Antireq: AMATH 373, CHEM 356, ECE 405, NE 332, PHYS 233, 234

Rationale : This course is added in order to meet requirements needed for quantum specialization. ECE 405 is being inactivated.

Effective 01-SEP-2024

ECE 405A (0.50) LEC, TUT Quantum Information Processing Devices
Short Title: Quant Info Processing Devices

This course introduces physical implementations of quantum computers with an emphasis on common and connecting themes. The course topics include the review of quantum mechanics, criteria to build quantum computers, quantum circuit models, and four quantum hardware platforms (nuclear magnetic resonance, optical photons, trapped ions, and superconducting systems) in terms of qubit definition, universal gate sets, initialization, measurement strategies, and decoherence processes.

Requisites : Prereq: One of AMATH 373, CHEM 356, ECE 305, NE 332, PHYS 234, PHYS 233
Antireq: PHYS 468
Rationale : This course is added in order to meet requirements needed for quantum specialization.

Effective 01-SEP-2024

ECE 405B (0.50) LAB, LEC, TUT Fundamentals of Experimental Quantum Information

Short Title: Fund Experimental Quant Info

This course introduces basic experimental tools and techniques on which the main quantum computing platforms are based. The course topics will be covered through lectures and through hands-on lab experiments and will include photon generation and detection; Rabi oscillations, coherence, and NMR; atom cooling and ion traps; low temperature physics; and Bell inequalities and two-qubit quantum tomography.

Requisites : Prereq: One of AMATH 373, CHEM 356, ECE 305, NE 332, PHYS 233, PHYS 234.
Rationale : This course is added in order to meet requirements needed for quantum specialization.

Effective 01-SEP-2024

ECE 405C (0.50) LEC, TUT Programming of Quantum Computing Algorithms

Short Title: Quant Comp Algo Programming

The course will teach basic elements to create quantum circuits in quantum computers: qubits, single-qubit gates, two-qubit gates, quantum operators, and measurements. A quantum programming language (one of three: Qiskit, q#, PennyLane) is used to implement representative quantum circuits in quantum simulators or real quantum computers through a cloud service such as IBM Q experience or Microsoft Azure or Xanadu.

Requisites : Prereq: One of AMATH 373, CHEM 356, ECE 305, NE 332, PHYS 233, PHYS 234.
Rationale : This course is added in order to meet requirements needed for quantum specialization.

Effective 01-SEP-2024

ECE 405D (0.50) LEC, TUT Superconducting Quantum Circuits

Short Title: Superconducting Quant Circuits

This course offers applications of superconductivity in quantum information devices and circuits at microwave frequencies. Introducing the basic physics of superconductivity, superconducting transmission lines and cavity resonators are presented as the elementary passive components in quantum circuits. Josephson junctions as an active element in superconducting electronics is introduced and it is shown how a qubit can be constructed based on various two-level system manipulated in Josephson junctions. Three superconducting qubit archetypes, i.e. charge, flux and phase, are introduced along with some hybrid qubits such as transmon and fluxonium. Single qubit operation and qubit coupling in the form of circuit cavity electrostatics and their associated qubit readout are discussed. Some existing quantum computers such as IBM Q System One and Google Sycamore are briefly introduced.

Requisites : Prereq: One of AMATH 373, CHEM 356, ECE 305, NE 332, PHYS 233, PHYS 234.
Rationale : This course is added in order to meet requirements needed for quantum specialization.

1.5 Mechanical and Mechatronics Engineering

Effective 01-SEP-2024

MTE 182 (0.50) LEC, TUT Physics 2: Dynamics

Short title: Dynamics

Kinematic of particles, rectilinear and curvilinear motion. Kinetics of particles. Energy and momentum methods. Systems of particles. Kinematics and kinetics of rigid bodies; planar motion. [Offered: F, W]

Requisites : Prereq: Level at least 2A Mechatronics Engineering.
Antireq: BME 182, SYDE 182

Rationale : Creating new courses with MTE identifier for courses only taught to mechatronics students based on strong recommendation from Engineering finance tracking purposes. This also allows for department content control.

Effective 01-SEP-2024

MTE 252 (0.50) LEC, TUT Linear Systems and Signals

Short Title: Linear Systems & Signals

Models and analysis of linear systems. Discrete time systems, continuous time systems; difference and differential equations; impulse and frequency response. Complex frequency, functions of complex variable transform domain techniques: Z transforms; Fourier analysis, Laplace transform. Transfer functions and frequency response, frequency domain analysis of linear systems; sample theory, stability, and linear filters.

Requisites : Prereq: Level at least 2B Mechatronics Engineering or 2B Mechanical Engineering.
Antireq: BME 252, SYDE 252

Rationale : Creating new courses with MTE identifier for courses only taught to mechatronics students based on strong recommendation from Engineering finance tracking purposes. This also allows for department content control.

Effective 01-SEP-2024

MTE 351 (0.50) LEC, TUT Systems Models 1

Short Title: Systems Models

Introduction to systems modelling and analysis. Graph theoretic models and formulation of system equations. State space formulation and solution. Time and frequency domain solution. Application to engineering systems. [Offered: W, S]

Requisites : Prereq: Level at least 3A Mechatronics Engineering
Antireq: SYDE 351

Rationale : Creating new courses with MTE identifier for courses only taught to mechatronics students based on strong recommendation from Engineering finance tracking purposes. This also allows for department content control.

Effective 01-SEP-2024

MTE 352 (0.50) LAB, LEC, TUT Fluid Mechanics 1

Short Title: Fluid Mechanics 1

Physical properties of fluids and fundamental concepts in fluid mechanics. Hydrostatics. Conservation laws for mass, momentum, and energy. Flow similarity and dimensional analysis as applied to engineering problems in fluid mechanics. Laminar and turbulent flow. Engineering applications such as flow measurement, flow in pipes, and fluid forces on moving bodies.

Requisites : Prereq: Level at least 3A Mechatronics Engineering. Coreq: MTE 309.
Antireq: ME 351

Rationale : Creating new courses with MTE identifier for courses only taught to mechatronics students based on strong recommendation from Engineering finance tracking purposes. This also allows for department content control.

Effective 01-SEP-2024

MTE 484 (0.50) LAB, LEC, TUT Digital Control Applications

Short title: Control Applications

Dynamic system modelling: linear, nonlinear, state-space, sample data systems, computer simulation, system identification. Discrete system stability and dynamic performance. Nonlinear system analysis, limit cycles. Digital control system design: emulation methods, z-domain, frequency domain, pole placement. Implementation of digital controllers. Laboratory projects in computer control of mechatronic and other systems. [Offered: F]

Requisites : Prereq: (ECE 380; Level at least 4A Computer Engineering or Electrical Engineering) or (MTE 360; Level at least 4A Mechatronics Eng) or (ME 360; Mechanical Eng./Mechatronics Option) or (SYDE 352; Systems Design Eng/Mechtr Option)

Antireq: ECE 481, ECE 484

Rationale :

Creating new courses with MTE identifier for courses only taught to mechatronics students based on strong recommendation from Engineering finance tracking purposes. This also allows for department content control.

1.6 Nanotechnology Engineering

Effective 01-SEP-2024

NE 380L (0.25) LAB Nanobiotechnology Engineering Laboratory

Short title: Nanobiotechnology Lab

This laboratory course introduces students to biotechnology topics including bacterial transformations, isolation of plasmids, biomacromolecule analysis, polymerase chain reaction (PCR), and design of nanobiosensors and encapsulation techniques for drug delivery. [Offered: S, first offered Spring 2027]

Requisites : Prereq: One of NE 281, BME 285, CHE 161, BIOL 130 Antireq: BIOL 240L, CHEM 233L, CHEM 237L, BME 285L

Rationale : Laboratory course added for providing required learning experience of students

1.7 Systems Design Engineering

Effective 01-SEP-2024

SYDE 300 (0.13) PRJ, SEM Work-term Symposium Poster

Short title: Symposium Poster

A work-term poster is composed and presented at the Work-term symposium. The poster and presentation provide an opportunity for students to effectively communicate and reflect on their engineering experience gained during their co-op work terms. In the poster and presentation, students draw connections between the theoretical aspects of engineering taught in the classroom and the practical applications of that theory in the workplace. [Offered: W, first Offered: Winter 2024]

Requisites : Prereq: PD11; Level at least 3B Systems Design Engineering.
Antireq: WKRPT 400, 401

Rationale : Systems Design Engineering is replacing the 3 work-term reports with two new requirements (Work-term symposium poster and PD 11). This will reduce the workload on students and provide opportunity to expand on their communication skills. The poster symposium allows students to reflect on their cooperative work term experiences both from a lifelong and technical experience perspective and share with the broader community through a symposium held in 3B.

**University of Waterloo Undergraduate
Catalog Report
Faculty of Engineering**

Page No. 1
Run Date 09-JUN-2023
Meeting Number(s) 2

COURSE CHANGES (for approval)

2.1 Architectural Engineering

01-SEP-2024

Current Catalog Information

AE 100 (0.50) LEC, STU, TUT Concepts Studio
An introduction to the fundamental engineering methods, principles and skills, design and communication in architectural engineering. Techniques in analytical sketching, orthographic drawing, construction documentation, problem definition, and scaled model building will underlie the collaborative development of (a) small-scale design project(s). Students will become familiar with the language and anatomy of buildings, the studio environment and culture of peer evaluation and juried work critique, and the fundamental conventions of design. Introduction to report writing, documentation, and fundamental two-dimensional computer-aided design (2D CAD) software and tools. [Offered: F]
No Special Consent Required
Requisites : Prereq: Level at least 1A Architectural Engineering

Effective 01-SEP-2024

Component Change: ~~LEC, STU, TUT~~
Rationale : Accurately reflect the nature of the courses following a recently approved change to components description. (SUC Feb 22). The change components will match how the course is currently taught.

Current Catalog Information

AE 125 (0.50) LEC, STU, TUT Structural Design Studio
Development of design and communication skills through application in projects involving various building or bridge types. The role of structure in the built environment is explored, including issues of materiality and technology. Exposure to three-dimensional (3D) modelling and model building. [Offered: S]
No Special Consent Required
Requisites : Prereq: AE 100; Level at least 1B Architectural Engineering

Effective 01-SEP-2024

Component Change: ~~LEC, STU, TUT~~
Rationale : Accurately reflect the nature of the courses following a recently approved change to components description. (SUC Feb 22). The change components will match how the course is currently taught.

Current Catalog Information

AE 200 (0.50) LEC, STU, TUT Enclosure Design Studio
Development of design and communication expertise through studio projects involving various building enclosure types. Exposure to building enclosure materials, systems, applications, and methods of representation. Emphasis placed on critical evaluation, problem solving, and design synthesis. Introduction to industry standard three-dimensional computer-aided design (3D CAD) software. [Offered: W]
No Special Consent Required
Requisites : Prereq: AE 125; Level at least 2A Architectural Engineering

Effective 01-SEP-2024

Component Change: ~~LEC, STU, TUT~~
Rationale : Accurately reflect the nature of the courses following a recently approved change to components description. (SUC Feb 22). The change components will match how the course is currently taught.

Current Catalog Information

AE 225 (0.50) LEC, STU, TUT Environmental Building Systems Studio
Environmental performance of buildings studied via physical investigations, demonstrations, case studies, and design exercises with a focus on building mechanical and electrical systems and lighting. Embodied energy and life-cycle implications will be introduced.
[Offered: F]
No Special Consent Required
Requisites : Prereq: AE 200; Level at least 2B Architectural Engineering

Effective 01-SEP-2024

Component Change: ~~LEC, STU, TUT~~
Rationale : Accurately reflect the nature of the courses following a recently approved change to components description. (SUC Feb 22). The change components will match how the course is currently taught.

Current Catalog Information

AE 300 (1.00) LEC, PRJ, STU, TUT Architectural Engineering Studio 1
Comprehensive mid-sized community building design project(s) in collaboration with the School of Architecture. Integration of structure, systems, and architecture explored with case studies. Preparation of construction drawings and specifications. [Offered: S]
No Special Consent Required
Requisites : Prereq: AE 225; Level at least 3A Architectural Engineering

Effective 01-SEP-2024

Component Change: ~~LEC, PRJ, STU, TUT~~
Rationale : Accurately reflect the nature of the courses following a recently approved change to components description. (SUC Feb 22). The change components will match how the course is currently taught.

Current Catalog Information

AE 325 (0.50) LEC, PRJ Architectural Engineering Studio 2
Comprehensive large multi-storey building design project(s) in collaboration with the School of Architecture. Integration of structure, systems, and architecture explored with case studies. Preparation of construction drawings and specifications. [Offered: W]
No Special Consent Required
Requisites : Prereq: AE 300; Level at least 3B Architectural Engineering

Effective 01-SEP-2024

Component Change: ~~LEC, PRJ, STU~~
Rationale : Accurately reflect the nature of the courses following a recently approved change to components description. (SUC Feb 22). The change components will match how the course is currently taught.

Current Catalog Information

AE 405 (0.50) LAB, LEC, TST, TUT Building Performance Measurement Lab
Introduction to the techniques and utility of measuring building performance both during construction, during operation, and before retrofit. Stiffness, vibration, rain penetration, air leakage, heat flow, durability, solar control, acoustics, lighting, damage assessment, and energy consumption. [Offered: S]
No Special Consent Required
Requisites : Prereq: AE 280

Effective 01-SEP-2024

Description Change: [Introduction to the framework and techniques for measuring the performance of buildings during construction, commissioning, and occupancy. Assessment methods and testing standards for topics such as structural damage, stiffness and vibration, durability, rain penetration, air leakage, hygrothermal performance, HV AC system performance, indoor environmental quality, and energy performance will be discussed.](#)

Rationale : Description is being updated after first offering of this course to better align with possible topics that will be discussed in the course. This new description allows flexibility in selection of topics to include in course plans without further edits to the description.

2.2 Chemical Engineering

Current Catalog Information

CHE 561 (0.50) LEC Biomaterials and Biomedical Design
An overview of nanomedicine and nanotechnology-based biomedical devices. Strategies and technologies for designing, testing, and manufacturing biomaterials and tissue-engineering products. Biological and clinical applications. Manufacturing challenges and regulatory procedures for commercialization. [Offered: W]
No Special Consent Required
Requisites : Prereq: Level at least 3B Chemical Engineering.
Antireq: BME 489 (Topic 1: Biocompatibility and Biomaterial)
Cross-listed as: NE 488

Effective 01-SEP-2024

Requisite Change : Prereq: ~~Level at least 3B Chemical Engineering~~ [CHE560](#).
Antireq: BME 489 (Topic 1: Biocompatibility and Biomaterial) (Cross-listed with NE 488)
Rationale : NE 488 which is cross-listed with CHE 561 has a prerequisite NE 481 which is now cross-listed with CHE 560. These courses should have comparable prerequisites.

2.3 Civil and Environmental Engineering

Current Catalog Information

CIVE 332 (0.50) LEC, TST, TUT Civil Systems and Project Management
Introduction to conceptual planning, construction, management, optimization, and life-cycle performance assessment of civil engineering systems including capital projects. Fundamentals of decision theory including concepts of risk, uncertainty, utility, probability, value of information, and game theory. Tools for supporting decision-making process, including linear and integer programming, network models, optimization, and Monte Carlo simulation. Risk- and cost-benefit analysis of public projects and their impact on sustainability, and quality of life. [Offered: W]
No Special Consent Required
Requisites : Prereq: (CIVE 221 or GEOE 221), (CIVE 222 or GEOE 223), (CIVE 224 or GEOE 224); Level at least 3A Civil or Geological Engineering. Antireq: ENVE 335, MSCI 331, SYDE 411

Effective 01-SEP-2024

Requisite Change : Prereq: ([AE221 or](#) CIVE 221 or GEOE 221), ([AE223 or](#) CIVE 222 or GEOE 223), ([AE 224 or](#) CIVE 224 or GEOE 224); Level at least 3A [Architectural](#), Civil or Geological Engineering.
Antireq: ENVE 335, MSCI 331, SYDE 411
Rationale : Updating prerequisites to include architectural engineering cross-listed courses for easier student enrollment.

Current Catalog Information

CIVE 460 (0.50) LEC, TUT Engineering Biomechanics
Introduction to engineering technologies applicable to the field of biomechanics. Specific topics covered may include biological growth, form and function; biomaterials; kinematics and neurology of gait; biotribology; joint anatomy, function and repair; occupational biomechanics; trauma prevention. [Offered: W]
No Special Consent Required
Requisites : Prereq: CIVE 105 or ME 219 or SYDE 286
(cross-listed with ME 574)

Effective 01-SEP-2024

Requisite Change: Prereq: [AE 105 or](#) CIVE 105 or ME 219 or SYDE 286
(cross-listed with ME 574)

Rationale : Updating prerequisites to include architectural engineering cross-listed courses for easier student enrollment.

Current Catalog Information

CIVE 596 (0.50) LEC, TUT Construction Engineering
Topics in construction engineering and management including methods of delivering construction, contractual relationships, prevailing construction practices, construction equipment, concrete form design, concrete, steel, and masonry construction, introduction to trenchless technology, construction safety, planning and scheduling of repetitive construction, cash flow analysis, and construction project control. [Offered: S]
No Special Consent Required
Requisites : Prereq: Level at least 4A Civil, Environmental or Geological Engineering

Effective 01-SEP-2024

Requisite Change : Prereq: Level at least 4A Civil, Architectural, Environmental or Geological Engineering

Rationale : Updating prerequisites to include architectural engineering cross-listed courses for easier student enrollment.

2.4 Electrical & Computer Engineering

Current Catalog Information

ECE 124 (0.50) LAB, LEC, TUT Digital Circuits and Systems
Number systems and Boolean arithmetic. Boolean algebra and simplification of Boolean functions. Combinational circuits. Sequential circuits; design and implementation. Hardware description languages. Timing analysis. Implementation technologies. [Offered: W,S]
No Special Consent Required
Requisites : Prereq: Level at least 1B Computer Engineering or Electrical Engineering or Software Engineering

Effective 01-SEP-2024

Requisite Change : Prereq: Level at least 1B Computer Engineering or Electrical Engineering or Software Engineering or Computer Science/Digital Hardware Specialization

Rationale : Updated prerequisites as this course is needed for the Computer Science/Digital Hardware specialization program.

Current Catalog Information

ECE 203 (0.50) LEC, TUT Probability Theory and Statistics 1
Ensemble model of randomness. Conditional probability, independence, and Bayes' theorem. Random variables, probability distribution functions. Expected values. Collections of random variables, joint and marginal probability distributions, and correlation. Introduction to random processes. [Offered: F, S]
No Special Consent Required
Requisites : Prereq: ECE 103, (ECE 205 or MATH 211), MATH 119; Level at least 2B Computer or Electrical Engineering. Antireq: ECE 306, 316

Effective 01-SEP-2024

Requisite Change : Prereq: ~~ECE 103~~, ECE 108, (ECE 205 or MATH 211), MATH 119; Level at least 2B Computer or Electrical Engineering. Antireq: ECE 306, 316

Rationale : ECE 103 is being inactivated and replaced by ECE 108 in the curriculum.

Current Catalog Information

ECE 222 (0.50) LAB, LEC, TUT Digital Computers
Computer organization. Memory units, control units, I/O operations. Assembly language programming, translation and loading. Arithmetic logic units. Computer case studies. [Offered: F, W]
No Special Consent Required
Requisites : Prereq: ECE 124; (CS 115 or 135 or 137 or 145 or ECE 150); Level at least 2A Computer Engineering or Electrical Engineering or Software Engineering or Computer Science/Digital Hardware Option

Effective 01-SEP-2024

Requisite Change : Prereq: (One of BME 393, ECE 124, MTE 262, SYDE 192), (One of BME 121, CS 115,135,137,145, ECE 150, MTE 121/GENE 121, MSCI 211, SYDE 121); Level at least 2A BASc/BSE or Computer Science/Digital Hardware Specialization

Rationale : Prerequisites updated to make this course available to students in various engineering options. Computer Science renamed their option to a specialization and lining up prerequisites to reflect this change.

Current Catalog Information

ECE 224 (0.50) LAB, LEC, TUT Embedded Microprocessor Systems

Microprocessor system architecture, bus systems, memory systems, peripherals, parallel interfaces, serial interfaces, analog interfaces, data transfer, synchronization, error detection/correction, testing and debugging. [Offered F, W, S]

No Special Consent Required

Requisites : Prereq: (ECE 124, 222; Level at least 2B Computer Engineering or 2B Electrical Engineering) or (ECE 124, 222; Level at least 3A Software Engineering). Antireq: MTE 325

Effective 01-SEP-2024

Requisite Change : Prereq: ([One of BME 393, ECE 124, MTE 262, SYDE 192](#)); ECE 222; Level at least [2B BASc/BSE or Computer Science/ Digital Hardware Specialization](#). Antireq: MTE 325

Rationale : Prerequisites updated to make this course available to students in various engineering options. Computer Science renamed their option to a specialization and lining up prerequisites to reflect this change.

Current Catalog Information

ECE 252 (0.50) LAB, LEC, TUT Systems Programming and Concurrency

Processes and threads (pthreads); system calls; concurrency (semaphore, mutex, monitors, and barrier synchronization); user-level memory management. Performance and correctness of concurrent systems. Deadlock detection and recovery; file systems. [Offered: F, S]

No Special Consent Required

Requisites : Prereq: ECE 250; Level at least 2B Computer Engineering or Electrical Engineering. Antireq: CS 343, 350, ECE 254, SE 350

Effective 01-SEP-2024

Requisite Change : Prereq: ([One of BME 122, ECE 250, MSCI 240, MTE 140, SYDE 223](#)); [Level at least 2B BASc/BSE](#). Antireq: CS 343, 350, ~~ECE 254~~, SE 350

Rationale : Prerequisites updated to make this course available to students in various options in engineering. ECE 254 is part of an old curriculum and is being inactivated.

Current Catalog Information

ECE 320 (0.50) LAB, LEC, TUT Computer Architecture

Organization and performance of uniprocessors, pipelined processors, dynamically scheduled processors, parallel processors and multiprocessors; memory and cache structures; multiprocessor algorithms and synchronization techniques; special-purpose architectures. [Offered: F]

No Special Consent Required

Requisites : Prereq: CS 354 or ECE 222; Level at least 3B Computer Engineering or Electrical Engineering or Software Engineering or Computer Science/Digital Hardware Option. Antireq: ECE 429

Effective 01-SEP-2024

Requisite Change : Prereq: ~~CS 354~~, ECE 222, [ECE 327](#); [Level at least 3B BASc/BSE](#) or [Computer Science/Digital Hardware Specialization](#). Antireq: ECE 429

Rationale : Prerequisites updated to make this course available to students in various engineering options. Computer Science renamed their option to a specialization and lining up prerequisites to reflect this change. In addition, CS 354 has been inactivated. ECE 327 has been added to ensure knowledge of HDLs for the project in ECE 250.

Current Catalog Information

ECE 327 (0.50) LAB, LEC, TST, TUT Digital Hardware Systems

Design and modelling of digital hardware systems using a hardware description language. Development process. Impact of implementation technologies. Performance analysis and optimization. Functional verification. Timing analysis. Power analysis and optimization. Faults and testability. Reliability and fault tolerance.[Offered: W, S]

No Special Consent Required

Requisites : Prereq: (ECE 222 or MTE 241); (ECE 124 or MTE 262) or (SYDE 192 and SYDE 192L); Level at least 3A Computer

Effective 01-SEP-2024

Requisite Change : Prereq: (ECE 222 or MTE 241); (ECE 124 or MTE 262) or (SYDE 192 and SYDE 192L); Level at least 3A BAsC/BSE or Computer Science/Digital Hardware Specialization.
Rationale : Prerequisites updated to make this course available to students in various options in engineering. Computer Science renamed their option to a specialization and lining up prerequisites to reflect this change.

Current Catalog Information

ECE 350 (0.50) LAB, LEC, TUT Real-Time Operating Systems
Memory and virtual memory and caching; I/O devices, drivers, and permanent storage management; process scheduling; queue management in the kernel; real-time kernel development. Aspects of multi-core operating systems. [Offered: W, S]
No Special Consent Required
Requisites : Prereq: ECE 252; Level at least 3A Computer Engineering or Electrical Engineering.
Antireq: CS 350, ECE 254, SE 350

Effective 01-SEP-2024

Requisite Change : Prereq: ECE 252; Level at least 3A BAsC/BSE.
Antireq: CS 350, ~~ECE 254~~, SE 350
Rationale : Prerequisites updated to make this course available to students in various options in engineering. ECE 254 is part of an old curriculum and is being inactivated.

Current Catalog Information

ECE 351 (0.50) LAB, LEC, TUT Compilers
Programming paradigms, compilation, interpretation, virtual machines. Lexical analysis, regular expressions, and finite automata. Parsing, context-free grammars, and push-down automata. Semantic analysis, scope and name analysis, type checking. Intermediate representations. Control flow. Data types and storage management. Code generation. [Note: Electrical Engineering students with at least 80% in ECE 108 will be granted an override for ECE 208 prerequisite on the understanding that they will need to make up missed material from ECE 208 on their own. Offered: F]
No Special Consent Required
Requisites : Prereq: ECE 208, 250; Level at least 3B Computer Engineering or Electrical Engineering

Effective 01-SEP-2024

Requisite Change : Prereq: (One of BME 122, ECE 250, MSCI 240, MTE140, SYDE 223); One of CS 245/245E or ECE 208 or SE 212
Rationale : Prerequisites updated to make this course available to students in various options in engineering.

Current Catalog Information

ECE 356 (0.50) LAB, LEC, TST, TUT Database Systems
Data models, file systems, database system architectures, query languages, integrity and security, database design. [Note: Electrical Engineering students with at least 80% in ECE 108 will be granted an override for ECE 208 prerequisite on the understanding that they will need to make up missed material from ECE 208 on their own. Offered: F]
No Special Consent Required
Requisites : Prereq: ECE 250; One of CS 245 or ECE 208 or SE 212. Antireq: CS 348/448

Effective 01-SEP-2024

Requisite Change : Prereq: (One of BME 122, ECE 250, MSCI 240, MTE 140, SYDE 223); One of CS 245/245E or ECE 208 or SE 212. Antireq: CS 348.
Rationale : Prerequisites updated to make this course available to students in various options in engineering. Changed to 348 (from 448) in Sept 2006.

Current Catalog Information

ECE 406 (0.50) LAB, LEC, TUT Algorithm Design and Analysis
Design and analysis of efficient, correct algorithms. Advanced data structures, divide-and-conquer algorithms, recurrences, greedy algorithms, dynamic programming, graph algorithms, search and backtrack, inherently hard and unsolvable problems, approximation

and randomized algorithms, and amortized analysis. [Offered: W]

No Special Consent Required

Requisites : Prereq: One of BME 122, ECE 250, MTE 140, SYDE 223. Antireq: CS 341, 466, SYDE 423

Effective 01-SEP-2024

Requisite Change : Prereq: One of BME 122, ECE 250, [MSCI 240](#), MTE 140, SYDE 223.
Antireq: CS 341, 466, SYDE 423

Rationale : Prerequisites updated to make this course available to students in various options in engineering.

Current Catalog Information

ECE 409 (0.50) LEC, TUT Cryptography and System Security

Introduction to cryptology and computer security, theory of secure communications, points of attack, conventional cryptographic systems, public key cryptographic systems, standards, firewalls, wireless system security, applications. [Offered: W]

No Special Consent Required

Requisites : Prereq: ECE 358; Level at least 4A Computer Engineering or Electrical Engineering or Software Engineering. Antireq: CO 487, CS 458

Effective 01-SEP-2024

Requisite Change : Prereq: ECE 358; Level at least [4A BASc/BSE](#). Antireq: CO 487, CS 458

Rationale : Prerequisites updated to make this course available to students in various options in engineering.

Current Catalog Information

ECE 414 (0.50) LEC, TUT Wireless Communications

Overview of wireless communications including standards. Characterization of mobile radio propagation channels. Signal representations. Transmission and reception techniques for wireless channels. Fundamentals of cellular communications and multiple-access schemes. [Offered: S]

No Special Consent Required

Requisites : Prereq: ECE 306, ECE 318; Level at least 4A Computer Engineering or Electrical Engineering

Effective 01-SEP-2024

Requisite Change : Prereq: ECE [307](#), ECE 318; Level at least 4A Computer Engineering or Electrical Engineering

Rationale : ECE 306 is no longer offered by the department and was replaced by ECE 107; however, the prerequisites for this course were not updated at the time.

Current Catalog Information

ECE 423 (0.50) LAB, LEC, TST, TUT Embedded Computer Systems

Specification and design of embedded systems, specification languages, hardware/software co-design, performance estimation, co-simulation, verification, validation, embedded architectures, processor architectures and software synthesis, system-on-a-chip paradigm, retargetable code generation and optimization, verification and validation, environmental issues and considerations. [Offered: W]

No Special Consent Required

Requisites : Prereq: (ECE 254 or SE 350), (ECE 224 or MTE 325), ECE 327; Level at least 4A Computer Engineering or Electrical Engineering or Software Engineering. Antireq: SYDE 524

Effective 01-SEP-2024

Requisite Change : Prereq: ([One of CS 350, ECE252, MTE241](#) or SE 350), (ECE 224 or MTE 325);
Level at least 4A BASc/BSE. Antireq: SYDE 524

Rationale : Prerequisites updated to make this course available to students in various options in engineering.

Current Catalog Information

ECE 451 (0.50) LAB, LEC, TST, TUT Software Requirements Specification and Analysis

Introduces students to the requirements definition phase of software development.

Models, notations, and processes for software requirements identification, representation, analysis, and validation. Cost estimation from early documents and specifications. [Note: Lab is not scheduled and students are expected to find time in open hours to complete their work.]

No Special Consent Required

Requisites : Prereq: ECE 250; Level at least 3A Computer Engineering or Electrical Engineering.
Antireq: SE 463

Cross-listed as: CS 445

Effective 01-SEP-2024

Requisite Change : Prereq: [One of BME 122](#), ECE 250, [MSCI 240](#), [MTE 140](#), [SYDE 223](#); Level at least 3A BAsC/BSE.
Rationale : Prerequisites updated to make this course available to students in various options in engineering.

Current Catalog Information

ECE 452 (0.50) LAB, LEC, TST, TUT Software Design and Architectures
Introduces students to the design, implementation, and evolution phases of software development. Software design processes, methods, and notation. Implementation of designs. Evolution of designs and implementations. Management of design activities.
[Note: Lab is not scheduled and students are expected to find time in open hours to complete their work.]
No Special Consent Required
Requisites : Prereq: ECE 250; Level at least 3A Computer Engineering or Electrical Engineering. Antireq: CS 430, SE 464
Cross-listed as: CS 446

Effective 01-SEP-2024

Requisite Change : Prereq: [One of BME 122](#), ECE 250, [MSCI 240](#), [MTE 140](#), [SYDE 223](#); Level at least 3A BAsC/BSE.
Rationale : Prerequisites updated to make this course available to students in various options in engineering.

Current Catalog Information

ECE 453 (0.50) LAB, LEC, TST, TUT Software Testing, Quality Assurance, and Maintenance
Introduces students to systematic testing of software systems. Software verification, reviews, metrics, quality assurance, and prediction of software reliability and availability. Related management issues. [Note: Lab is not scheduled and students are expected to find time in open hours to complete their work.]
No Special Consent Required
Requisites : Prereq: ECE 250; Level at least 3A Computer Engineering or Electrical Engineering. Antireq: SE 465
Cross-listed as: CS 447

Effective 01-SEP-2024

Requisite Change : Prereq: [One of BME 122](#), ECE 250, [MSCI 240](#), [MTE 140](#), [SYDE 223](#); Level at least 3A BAsC/BSE.
Rationale : Prerequisites updated to make this course available to students in various options in engineering.

Current Catalog Information

ECE 454 (0.50) LAB, LEC, TUT Distributed Computing
Principles of distributed computing; architectures and middleware; servers, processes, and virtualization; upper-layer network protocols, interprocess communication and remote procedure calling; concurrency, synchronization and distributed algorithms, dependable distributed systems and fault tolerance. [Offered: S]
No Special Consent Required
Requisites : Prereq: (ECE 252 or SE 350); Level at least 4A Computer Engineering or Electrical Engineering or Software Engineering.
Coreq: ECE 358 Software Engineering only.
Antireq: CS 454, 654

Effective 01-SEP-2024

Requisite Change : Prereq: [ECE 358](#); ([One of](#) ECE 252, [MTE 241](#) or SE 350); Level at least 4A BAsC/BSE. ~~Coreq: ECE 358 Software Engineering only.~~
Antireq: CS 454, 654
Rationale : Prerequisites updated to make this course available to students in various options in engineering. Removing Coreq as software students no longer need this as a co-req.

Current Catalog Information

ECE 455 (0.50) LAB, LEC, TST, TUT Embedded Software
Concepts, theory, tools, and practice to understand, design, and write embedded software. This course covers computing elements, structures in embedded software, resource access protocols, uniprocessor scheduling, programming-language support, languages for MDD (model-driven development), worst-case execution time analysis, and overview of embedded distributed systems. [Offered: S]
No Special Consent Required
Requisites : Prereq: ECE 350 or SE 350; Level at least 4A Electrical Engineering or Computer Engineering or Software Engineering

Effective 01-SEP-2024

Requisite Change : Prereq: [One of ECE 350, MTE 241, SE 350](#); Level at least [4A BASc/BSE](#).
Rationale : Prerequisites updated to make this course available to students in various options in engineering.

Current Catalog Information

ECE 457A (0.50) LEC, TST, TUT Co-operative and Adaptive Algorithms

The course starts by addressing the ill-structured problems and need for computational intelligence methods. It introduces the concepts of heuristics and their use in conjunction with search methods, solving problems using heuristics and metaheuristics, constraints satisfaction. The course also introduces the concepts of co-operation and adaptations and how they are influencing new methods for solving complex problems. The course starts by illustrating how the concepts of co-operation and adaptation are manifested in nature and how such models are inspiring new types of solutions methods. Topics to be covered include search algorithms, game playing, constraints satisfaction, meta-heuristics, evolutionary computing methods, swarm intelligence, ant-colony algorithms, particle swarm methods, adaptive and learning algorithms and the use of these algorithms in solving continuous and discrete problems that arise in engineering applications. [Offered: S]

No Special Consent Required

Requisites : Prereq: Level at least 4A Computer Engineering or Electrical Engineering or Mechatronics Engineering or Software Engineering

Effective 01-SEP-2024

Requisite Change : Prereq: [One of BME 122, ECE 250, MSCI 240, MTE 140, SYDE 223](#); Level at least 4A BASc/BSE.

Rationale: Prerequisites updated to make this course available to students in various options in engineering

Current Catalog Information

ECE 457B (0.50) LEC, TUT Fundamentals of Computational Intelligence

Fundamentals and recent advances in computational intelligence. Building accurate models with collected data or rules bases. Model-based prediction and classification. Concepts in machine learning, supervised and unsupervised learning, artificial neural networks, deep learning, feature extraction, feature selection, dimensionality reduction, classification and clustering, support vector machines. Approximate reasoning based on fuzzy set theory. Performance metrics to assess the validity of produced models. Multiple examples and case studies such as autonomous driving, intelligent manufacturing, natural language understanding, speech recognition, computer vision, stock market prediction, disease early detection and diagnosis. [Offered: W]

No Special Consent Required

Requisites : Prereq: Level at least 4A Biomedical Engineering or Computer Engineering or Electrical Engineering or Management Engineering or Mechanical Engineering or Mechatronics Engineering or Software Engineering or Systems Design Eng. Antireq: CS 486, SYDE 522

Effective 01-SEP-2024

Requisite Change : Prereq: [One of BME 122, ECE 250, MSCI 240, MTE 140, SYDE 223](#); Level at least 4A BASc/BSE.

Antireq: CS 486, SYDE 522

Rationale : Prerequisites updated to make this course available to students in various options in engineering

Current Catalog Information

ECE 458 (0.50) LAB, LEC, TST, TUT Computer Security

Introduction to computer security. Models of security. Elementary cryptography. Software security, vulnerabilities, threats, defenses and secure-software development processes. Threats to networks and defenses. Security issues at the application layer. Secure design principles, techniques and security evaluation. Privacy, ethics and legal issues. [Offered: S]

No Special Consent Required

Requisites : Prereq: ECE 252 or SE 350; Level at least 4A Computer Engineering or Electrical Engineering or Software Engineering. Antireq: CS 458

Effective 01-SEP-2024

Requisite Change : Prereq: One of ECE 252, MTE 241 or SE 350; Level at least 4A BAsC/BSE.

Antireq: CS 458

Rationale : Prerequisites updated to make this course available to students in various options in engineering

Current Catalog Information

ECE 459 (0.50) LAB, LEC, TST, TUT Programming for Performance

Profiling computer systems; bottlenecks, Amdahl's law. Concurrency: threads and locks.

Techniques for programming multicore processors; cache consistency.

Transactional memory. Streaming architectures, vectorization, and SIMD. High-performance programming languages. [Offered: W]

No Special Consent Required

Requisites : Prereq: ECE 252 or SE 350; Level at least 4A Electrical Engineering or Computer Engineering or Software Engineering

Effective 01-SEP-2024

Requisite Change : Prereq: One of ECE 252, MTE 241, SE 350; Level at least 4A BAsC/BSE.

Rationale : Prerequisites updated to make this course available to students in various options in engineering

Current Catalog Information

ECE 484 (0.50) LAB, LEC, TUT Digital Control Applications

Dynamic system modelling: linear, nonlinear, state-space, sample data systems, computer simulation, system identification. Discrete system stability and dynamic performance.

Nonlinear system analysis, limit cycles. Digital control system design: emulation methods, z-domain, frequency domain, pole placement. Implementation of digital controllers. Laboratory projects in computer control of mechatronic and other systems. [Offered: F]

No Special Consent Required

Requisites : Prereq: (MTE 360; Level at least 4A Mechatronics Eng) or (ME 360; Mechanical Eng./Mechatronics Option) or (SYDE 352; Systems Design Eng/Mechtr Option). Antireq: ECE 481

Effective 01-SEP-2024

Requisite Change : Prereq: ~~(MTE 360; Level at least 4A Mechatronics Eng) or~~ (ME 360; Mechanical Eng./Mechatronics Option) or (SYDE 352; Systems Design Eng/Mechtr Option). Antireq: ECE 481, MTE 484

Rationale : Changes to align newly proposed MTE 484 prerequisites.

Current Catalog Information

ECE 498A (0.50) PRJ, SEM Engineering Design Project

Team-oriented design project which comprises a significant design experience based on the knowledge and skills acquired by students in previous courses and on co-operative work terms. Development of the design specification and plan documents, followed by the initial design work. [Offered: F, W, S]

No Special Consent Required

Requisites : Prereq: ECE 390; Level at least 4A Computer Engineering or Electrical Engineering.

Effective 01-SEP-2024

Requisite Change : Prereq: ~~ECE 390~~; Level at least 4A Computer Engineering or Electrical Engineering.

Rationale : ECE 390 is part of an older curriculum and has been inactivated. Changes are being made to update the prerequisites to be accurate.

2.5 Management Engineering

Current Catalog Information

MSCI 332 (0.50) LEC, TUT Deterministic Optimization Models and Methods

This course builds on the material presented in MSCI 331, and explores more advanced optimization techniques and applications. Methods, such as integer optimization, dynamic programming, and heuristics, are introduced and used to design solution alternatives for applications from management engineering. This may include network and process design in logistics, transportation, telecommunications, and healthcare. [Offered: F]

No Special Consent Required

Requisites : Prereq: One of BME 411, CHE 521, CIVE 332, CO 250, ENVE 320, 335, MSCI 331, SYDE 411. Antireq: CO 327

Effective 01-SEP-2024

Title Change: [Fundamentals of Optimization](#)

Short Title Change: [Fundamentals of Optimization](#)

Description Change: [This course focuses on solution methods in linear, integer, and nonlinear optimization. Topics include the theory and algorithms of linear optimization, branch-and-bound, network algorithms, convexity, and optimality conditions](#) [Offered: F]

Requisites : One of BME 411, CHE 521, CIVE 332, CO 250, ENVE 320, 335, MSCI 232, 331, SYDE 411

Antireq: ~~CO 327~~, CO 255

Rationale : Revision of MSCI 332 course title, description and prerequisites were approved at the May 2023 SUC meeting; however, due to an administrative error, the anti-requisites were not updated accurately. This revision is to apply the revised anti-requisites that are more appropriately aligned.

2.6 Mechanical Engineering

Current Catalog Information

ME 321 (0.50) LEC, TUT Kinematics and Dynamics of Machines

Principles of the geometry of motion, uniform and non-uniform motion, linkage, gears, and analysis of mechanisms. Consideration of the static and dynamic forces in machines. Vibration analysis, response to shock, motion and force transmissibility, vibration isolation. [Offered: W,S]

No Special Consent Required

Requisites : Prereq: (ME 201 or MTE 202) and (ME 212 or SYDE 182); Level at least 3A Mechanical Engineering or Mechatronics Engineering

Effective 01-SEP-2024

Title Change: [Dynamics of Machines and Mechanical Vibrations](#)

Short Title Change: [Machine & Mech Vibration Dynam](#)

Description Change: Principles of the geometry of motion, uniform and non-uniform motion, linkage, and analysis of mechanisms. Consideration of the static and dynamic forces in machines. Vibration analysis, response to shock, motion and force transmissibility, vibration isolation, [and multi-DOF mechanical vibrations](#). [Offered: W,S]

Rationale : The title and description have been changed to make sure students emphasis more on the topic of vibrations which they would otherwise not receive unless they took vibration elective in fourth year

Current Catalog Information

ME 351 (0.50) LAB, LEC, TUT Fluid Mechanics 1

Physical properties of fluids and fundamental concepts in fluid mechanics. Hydrostatics. Conservation laws for mass, momentum and energy. Flow similarity and dimensional analysis as applied to engineering problems in fluid mechanics. Laminar and turbulent flow. Engineering applications such as flow measurement, flow in pipes and fluid forces on moving bodies. [Offered: F, W, S]

No Special Consent Required

Requisites : Prereq: (ME 250 or Coreq: MTE 309); Level at least 3A Mechanical or Mechatronics Engineering students only

Effective 01-SEP-2024

Requisite Change : [Antireq: MTE 352](#)

Rationale : Antirequisite change due to the creation of the MTE version of the course.

Current Catalog Information

ME 571 (0.50) LEC Air Pollution
Nature and sources of air pollution, chemical and biological aspects and effects on health and environment. Physical aspects of the atmosphere, thermodynamics, vertical variation of wind and temperature, stability, convection, atmospheric turbulence, diffusion equations, plumes, thermals, jets in stratified flow, radioactive plumes, micrometeorological instrumentation, air pollution control techniques and equipment monitoring instrumentation. [Offered: W]
No Special Consent Required
Requisites : Prereq: ME 362; Level at least 4A Mechanical Engineering

Effective 01-SEP-2024

Title Change: [Clean Air Technologies](#)

Short Title Change: [Clean Air Technologies](#)

Description Change: [Sources of air pollution and greenhouse gases, chemical and biological aspects, effects on health and environment. Thermodynamics and air emissions, air pollution control techniques and equipment monitoring instrumentation, carbon capture, utilization and storage, low-carbon technologies. \[Offered: W\]](#)

Requisites: Prereq: [AE 280, BME 384, CHE 211, CIVE 280, ENVE 280, GEO 280, ME 351, MTE 352, SYDE 383](#); Level at least 3B BASc/BSE.

Rationale : ME 571 was developed decades ago and it has become outdated as the course currently fails to address the growing concern over greenhouse gases, which is essential to sustainability. Changing the title to "Clean Air Technologies" gives an opportunity to focus more on air dispersion modeling that has become mature in industry. Students will have had to pass a fluids course in order to be successful in this course; therefore, prerequisites have been updated to ensure students are successful in this course.

2.7 Mechatronics Engineering

Current Catalog Information

MTE 120 (0.75) LAB, LEC, TST, TUT Circuits
Basic electromagnetic theory; magnetic circuits; electric circuit elements; DC circuit analysis; first-order transient response; AC circuit analysis; Diodes; Transistors: regions of operation, single-transistor amplifiers [Offered: W,S]
No Special Consent Required
Requisites : Prereq: Level at least 1B Mechatronics Engineering. Antireq: ECE 140, GENE 123.

Effective 01-SEP-2024

Description Change: [Basic electromagnetic theory; magnetic circuits; electric circuit elements; DC circuit analysis; first-order transient response; AC circuit analysis.](#) [Offered: W,S]

Rationale : Updated description to revised topics not covered in course. Diodes are used in labs and are only covered at a very superficial level. Transistors are not taught in this course any longer.

Current Catalog Information

MTE 262 (0.50) LAB, LEC, TUT Introduction to Microprocessors and Digital Logic
Number systems, logic gates, Boolean algebra. Karnaugh maps, and combinational logic design. Implementation of combinational logic circuits on Field Programmable Gate Arrays (FPGA) boards. Sequential logic and state machines. Programmable Logic Controllers (PLCs) and PLC programming using ladder logic and statement list. Microcomputer structure and operation, I/O, and interfacing and interrupts. Assembly language programming. Laboratory work includes microcomputer and PLC programming. [Offered: F,W]
No Special Consent Required
Requisites : Prereq: GENE 123 or MTE 120; Level at least 2B Mechanical or 2A Mechatronics Engineering. Antireq: ECE 222, ME 262

Effective 01-SEP-2024

Title Change:

Introduction to Digital Logic

Short Title Change:

Intro to Digital Logic

Description Change:

Number systems, logic gates, Boolean algebra. Karnaugh maps, and combinational logic design. Implementation of combinational and sequential logic circuits on Field Programmable Gate Arrays (FPGA) boards. Sequential logic and state machines. Programmable Logic Controllers (PLCs) and PLC programming using ladder. Laboratory work includes FPGA and PLC programming. [Offered: F,W]

Rationale :

Revised title and description to properly reflect what is taught in course. Statement lists are not used for PLC programming in the course. Microcomputer structure, I/O, interfacing, and interrupts have been removed as the topics overlap heavily with MTE 241 and MTE 325 content. Assembly language is no longer relevant for MTE students and has been replaced with sequential logic on FPGAs.

Current Catalog Information

MTE 325 (0.50) LAB, LEC, TUT Microprocessor Systems and Interfacing for Mechatronics Engineering

Synchronization and data flow; interfacing to sensors and actuators; microprocessor system architecture, parallel, serial, and analog interfacing; buses; direct memory access (DMA); interfacing considerations. [Offered: W,S]

No Special Consent Required

Requisites :

Prereq: ME 262 or MTE 262; Level at least 3A Mechatronics Engineering

Effective 01-SEP-2024

Description Change:

Synchronization and data flow; interfacing to sensors and actuators; parallel, serial, and analog interfacing; buses; direct memory access (DMA); interfacing considerations; privacy and security considerations. [Offered: W,S]

Rationale :

Minor adjustments made to description to refocus the content at the embedded systems level instead of low-level microcontroller hardware less relevant to MTE students. The current realities of IOT necessitate introducing privacy and security topics.

2.8 Nanotechnology Engineering

Current Catalog Information

NE 281 (0.50) LAB, LEC, TUT Biology for Nanotechnology Engineers

Introduction to cell biology. Cell structure and components. Critical molecular processes of living organisms. Applications to nanobiotechnology. [Offered: S, first offered spring 2024]

No Special Consent Required

Requisites :

Prereq: Level at least 2A Nanotechnology Engineering. Antireq: BIOL 130, CHE 161, BME 285

Effective 01-SEP-2024

Component Change:

LEC, TUT, ~~LAB~~

Rationale : Removed the lab requirement from this course to a separate lab course (NE380L). By removing the lab from this course and moving it to NE 380L, not only changes the term in which the lab is offered, but also the focus from biology to nanobiology.

Current Catalog Information

NE 481 (0.50) LEC Nanomedicine and Nanobiotechnology

Overview of biomedical engineering principles. Formulation and manufacturing processes for production of nanoparticles for medical applications. Pharmacokinetics, toxicity, and human physiology in drug administration. Route of administration and controlled delivery strategies. Formulation and manufacturing process for drug delivery in the biotechnology and pharmaceutical industries. [Offered: F]

No Special Consent Required

Requisites : Prereq: (NE 381 - for Nanotechnology Engineering); Level at least 4A Biomedical Engineering or Chemical Engineering or Nanotechnology Engineering

Effective 01-SEP-2024

Requisite Change : Prereq: (NE 381 - for Nanotechnology Engineering); Level at least 4A Biomedical Engineering or Chemical Engineering or Nanotechnology Engineering

New Cross-Listing: [CHE 560](#)

Rationale : Cross-listed course information added in requisite to line up with the new CHE560 prerequisites.

Current Catalog Information

NE 488 (0.50) LEC Biomaterials and Biomedical Design

An overview of nanomedicine and nanotechnology-based biomedical devices. Strategies and technologies for designing, testing, and manufacturing biomaterials and tissue-engineering products. Biological and clinical applications. Manufacturing challenges and regulatory procedures for commercialization. [Offered: W]

No Special Consent Required

Requisites : Prereq: NE 481; Level at least 3B Biomedical Engineering or Nanotechnology Engineering. Antireq: BME 489 (Topic: Biocompatibility and Biomaterial Engineering),

~~CHE 561~~

Cross-listed as: CHE 561

Effective 01-SEP-2024

Requisite Change: Prereq: NE 481; Level at least 3B Biomedical Engineering or Nanotechnology Engineering. Antireq: BME 489 (Topic: Biocompatibility and Biomaterial Engineering)

Rationale : Course is cross-listed with CHE 561, and therefore removing it as an antirequisite.

2.9 Systems Design Engineering

Current Catalog Information

SYDE 182 (0.50) LEC, TUT Physics 2: Dynamics

Kinematics of particles, rectilinear and curvilinear motion. Kinetics of particles, application to space mechanics. Energy and momentum methods. Systems of particles. Kinematics and kinetics of rigid bodies; planar motion. Vibrations. [Offered: F,W,S]

No Special Consent Required

Requisites : Prereq: Level at least 1B Systems Design Engineering or 2A Mechatronics Engineering .

Antireq: BME 182

Effective 01-SEP-2024

Description Change: Kinematics of particles, rectilinear and curvilinear motion. Kinetics of particles, application to space mechanics. Energy and momentum methods. Systems of particles. Kinematics and kinetics of rigid bodies; planar motion. [Offered: W]

Requisite Change : Prereq: Level at least 1B Systems Design Engineering.

Antireq: BME 182, [MTE 182](#)

Rationale : Proposed course and prerequisite changes due to the creation of MTE version of the course.

Current Catalog Information

SYDE 252 (0.50) LEC, TUT Linear Systems and Signals

Models and analysis of linear systems. Discrete time systems, continuous time systems; difference and differential equations; impulse and frequency response.

Complex frequency, functions of complex variables, transform domain techniques: Z transforms; Fourier analysis, Laplace transform. Transfer functions and frequency response, frequency domain analysis of linear systems; sampling theory, stability, and linear filters. [Offered: F, S]

No Special Consent Required

Requisites : Prereq: Level at least 2B Systems Design Engineering or 2B Mechanical Engineering or 2B Mechatronics Engineering.

Antireq: BME 252

Effective 01-SEP-2024

Requisite Change : Prereq: Level at least 2B Systems Design Engineering or 2B Mechanical Engineering.
Antireq: BME 252, [MTE 252](#)

Rationale : Proposed course and prerequisite changes due to the creation of MTE version of the course.

Current Catalog Information

SYDE 262 (0.50) LEC, TUT Engineering Economics of Design
This course examines a variety of economic factors in Engineering and how they impact design. Topics include business plans, price and output decisions, choosing among alternative inputs, production processes, evaluating alternative investments, equipment service life and depreciation, new products. [Offered: F]
No Special Consent Required
Requisites : Prereq: 2B Systems Design Engineering.
Antireq: BME 364, MSCI 261

Effective 01-SEP-2024

Description Change: [Topics include microeconomics, supply, demand and external costs in the context of systems design. Sustainability indicators, entrepreneurship, engineering economics, comparison of alternatives, project schedules and developing a business plan. \[Offered: F\]](#)

Rationale : Change in description made to match the current course content.

Current Catalog Information

SYDE 312 (0.50) LEC, TUT Applied Linear Algebra
Vector spaces, linear independence, linear maps and matrix representations. Inner product spaces and orthogonality. Gram-Schmidt algorithm and orthogonal projection. Interpolation and curve-fitting. Eigenvalues and eigenvectors, diagonalization, singular value decomposition. Applications and numerical methods. [Offered: W] No Special Consent Required
Requisites : Prereq: 3B Systems Design Engineering

Effective 01-SEP-2024

Requisite Change : Prereq: [3A](#) Systems Design Engineering

Rationale : Prerequisite change due to moving core course to 3A term.

Current Catalog Information

SYDE 351 (0.50) LEC, TUT Systems Models 1
Introduction to systems modelling and analysis. Graph theoretic models and formulation of system equations. State space formulation and solution. Time and frequency domain solutions. Application to engineering systems. [Offered: W, S] No Special Consent Required
Requisites : Prereq: 3A Systems Design Engineering or (MATH 115 and MTE 202 and level at least 3A Mechatronics Engineering)

Effective 01-SEP-2024

Requisite Change : Prereq: [Level at least 3A](#) Systems Design Engineering
[Antireq: MTE 351](#)

Rationale : Prerequisite changes due to the creation of MTE version of the course

Current Catalog Information

SYDE 411 (0.50) LEC, TUT Optimization and Numerical Methods
Root-finding methods. Linear programming, simplex and interior-point methods. Local and global optimization methods. Constrained optimization. Multiobjective and multidisciplinary design optimization. [Offered: F]
No Special Consent Required
Requisites : Prereq: 4A Systems Design Engineering. Antireq: BME 411

Effective 01-SEP-2024

Description Change:

Advanced methods for systems of linear equations. Root-finding methods. Linear programming, simplex and interior-point methods. Local and global optimization methods. Constrained optimization. Multiobjective and multidisciplinary design optimization. Prereq: 3B Systems Design Engineering. Prerequisite changes due to the creation of BME version of the course

Requisite Change :

Rationale :

Current Catalog Information

SYDE 532 (0.50) LEC, TUT Introduction to Complex Systems

The overwhelming majority of societal and ecological issues of pressing importance are complex systems; nonlinear interacting systems poorly characterized by linear analyses and Gaussian statistics. This course introduces the mathematics needed to understand such interactions, including nonlinear dynamics, critical and bifurcation behaviours, large-scale systems, power-law distributions, and statistical inference. The mathematical methods will be motivated by a set of case studies comprised of pressing large-scale interconnected problems such as global warming, energy shortages, desertification, overpopulation, poverty, and economic instability, to be investigated from a systems engineering perspective that will connect the mathematical analyses to real-world examples. [Offered: W]

No Special Consent Required

Requisites :

Prereq: Level at least 3A Biomedical Engineering or Level at least 3B Systems Design Engineering

Effective 01-SEP-2024

Description Change:

The overwhelming majority of societal, ecological and climate issues of pressing importance are complex systems; nonlinear dynamic interacting systems poorly characterized by linear analyses and Gaussian statistics. This course introduces the mathematics needed to understand such interactions, including nonlinear dynamics, critical and bifurcation behaviours, large-scale systems, and power-law distributions. ~~and statistical inference~~ The mathematical methods will be motivated by extensive examples and case studies such as global warming, energy shortages, desertification, overpopulation, poverty, and economic instability, to be investigated from a systems engineering perspective that will connect mathematical concepts to real-world examples. [Offered: F, W]

Rationale :

Change in description to reflect a change in topics for the course. The course will be a core 4A SYDE course and a technical elective course for other students outside of SYDE.

End of Report

3.1 COURSE INACTIVATIONS

(for approval)

Effective 01-SEP-2024

ECE 103 (0.50)

Rationale :

Discrete Mathematics

Course inactivation as the course has not been taught for many years

Effective 01-SEP-2024

ECE 155 (0.50)

Rationale :

Engineering Design with Embedded Systems

Course inactivated as it was not taught for many years

Effective 01-SEP-2024

ECE 204A (0.25)

Rationale :

Numerical Methods 1

Course inactivated since it was not taught for many years

Effective 01-SEP-2024

ECE 204B (0.25)

Rationale :

Numerical Methods 2

Course inactivated since it was not taught for many years

Effective 01-SEP-2024

ECE 242 (0.50)

Rationale:

Electronic Circuits 2

Course inactivated since it has not been taught for many years

Effective 01-SEP-2024

ECE 254 (0.50)

Rationale :

Operating Systems and Systems Programming

Course inactivated since it has not been taught for many years

Effective 01-SEP-2024

ECE 361 (0.50)

Rationale :

years

Power Systems and Components

This course has not been taught for many

Effective 01-SEP-2024

ECE 405 (0.50)

Rationale :

Offerings related to this area are being
substantially expanded and re-organized through the creation of ECE 305 and
405A/B/C/D.

Introduction to Quantum Mechanics

End of Report

4.1 School of Architecture [for approval]

Summary:

Minor Plan Modification

Replace PDARCH 4 with a PD course that includes a reflective report and drop work reports 103 & 303. Move work-report 203 up a term to be between 3A & 3B.

Background & Rationale:

- a) As all cohorts have been taking their fifth PD from the University-wide suite of offerings, we believe that they have been fulfilling the requirement of the reflective piece and requesting to drop Work Report 303 to recognize this duplication of effort. Requesting to back-date (to Fall 2019 cohort), removal of WKRPT 303. Requesting to back-date (to Fall 2020 cohort), removal of WKRPT 303 and moving WKRPT 203. This would positively impact the Fall 2020 and 2021 cohorts as they will not yet have completed their Work Report 303

Swapping PDARCH 4 with a PD selection. This will then incorporate a second reflection and allow the ability to drop Work Report 103. Moving WKRPT 203 (Firm Case Study) between 3A and 3B offers an appropriate place for this content. Requesting to back-date (to Fall 2021 cohort) and beyond the removal of WKRPT 103, PD swap and changes to list for PD#5 based on the previous WKRPT 303 request as being "current state" and effective dates. This change will positively impact all current students.

These changes were discussed with the RO and will not be made to older Calendars. This will be communicated to affected students.

Proposed Sequence: **Effective 2024 Table**

| Term | Professional Development Requirements |
|----------------|---|
| 1A Fall | Academic Study |
| 1B Winter | Academic Study |
| Spring | PDARCH 1: Portfolio Development |
| 2A Fall | Academic Study PDARCH 2: Co-op Fundamentals for Architects |
| Co-op 1 Winter | PDARCH 3: Electronic Communications and Web Design |
| 2B Spring | Academic Study |
| Co-op 2 Fall | PDARCH 4: Writing, Editing and Research PD # 4 Select one from: PD3, PD4, PD5, PD6, PD7, PD8, PD9, PD10, PD 11, PD12, PD 13 or PD22 |
| 3A Winter | Academic Study |
| Co-op 3 Spring | PD #5 Select one from: PD3, PD4, PD5, PD6, PD7, PD8, PD9, PD10, PD11, PD 12, PD13, or PD22 WKRPT 103 (Canadian Architectural Certification Board (CACB) Criteria |
| 3B Fall | Academic Study Work Report 203 (Firm Case Study) |
| Co-op 4 Winter | WKRPT 203 (Firm Case Study) |
| Co-op 5 Spring | Not applicable |
| 4A Fall | Academic Study (Rome) |
| Co-op 6 Winter | WKRPT 303 (Canadian Experience Record Book) |
| 4B Spring | Academic Study |

4.2 Architectural Engineering [for approval]

Summary:

1 - Minor Plan Changes

- a) Change elective choice in 4A/4B
- b) Add courses to the Architectural Engineering Technical Elective List 1
- c) Add ME 567 (Fire Safety Engineering) to Building Systems Specialization TE List 1

2 - Course Changes

- a) Removal of non-STU (Studio) components to all studio courses.
- b) Revising AE 405 (Building Performance Measurement) Lab description.

Background & Rationale:

1a) Changing elective choice allows students flexibility in 4A/4B and provides a wider range of technical elective options.

b) Adding CIVE 332 (Civil systems and Project Management), ME 436 (Welding and Joining Processes), ME 567 (Fire Safety Engineering), and SYDE 532 (Introduction to Complex systems) to the Architectural Engineering Technical Elective List 1 will provide a wider variety of subjects given student feedback has expressed List 1 courses was limiting, especially in the Winter term.

c) ME 567 (Fire Safety Engineering) covers practical issues and applications of fire safety, fire control and hazard assessment in the design of buildings and is directly related to the Building Specialization.

2a) Removal of non-STU (Studio) components to all currently designated studio courses for Architectural Engineering accurately reflects the nature of the courses following a recently approved change to component description approved by SUC **February 2022 meeting** page 25.

2b) Revising description of AE 405-Building Performance Measurement Lab to better align with possible topics that will be discussed in the course, such as HVAC system performance, indoor environmental quality, and energy performance. The new description allows flexibility in selection of topics to include in course plans without further edits to the description.

Architectural Engineering

MARK UP

The Architectural Engineering Academic Curriculum

The Architectural Engineering academic curriculum is detailed in the following sections. A total of 10 approved electives must be completed:

- Two Complementary Studies Electives
- One Natural Science Elective
- Seven Technical Electives

The term-by-term academic component of the curriculum is as follows:

Term 1A (Fall)

- **AE 100** Concepts Studio
- **AE 101** History of the Built Environment

- **AE 104** Mechanics 1
- **AE 115** Linear Algebra
- **CHE 102** Chemistry for Engineers
- **MATH 116** Calculus 1 for Engineering

Term 1B (Spring)

- **AE 105** Mechanics 2
- **AE 121** Computational Methods
- **AE 123/CIVE 123/ENVE 123/GEOE 123** Electrical Circuits and Instrumentation
- **AE 125** Structural Design Studio
- **AE 199** Seminar
- **MATH 118** Calculus 2 for Engineering

Term 2A (Winter)

- **AE 200** Enclosure Design Studio
- **AE 204** Solid Mechanics 1
- **AE 221** Advanced Calculus
- **AE 224** Probability and Statistics
- **AE 280** Fluid Mechanics and Thermal Sciences
- **AE 298** Seminar
- **COMMST 191/ENGL 191** Communication in the Engineering Profession

Term 2B (Fall)

- **AE 205** Solid Mechanics 2
- **AE 223** Differential Equations and Balance Laws
- **AE 225** Environmental Building Systems Studio
- **AE 265** Structure and Properties of Materials
- **AE 299** Seminar
- **WKRPT 200** Work-term Report
- Approved elective

Term 3A (Spring)

- **AE 279** Energy and the Environment
- **AE 300** Architectural Engineering Studio 1
- **AE 303** Structural Analysis
- **AE 353** Soil Mechanics and Foundations
- **AE 377** Structural Timber Design
- **AE 398** Seminar
- **WKRPT 300** Work-term Report

Term 3B (Winter)

- **AE 310** Introduction to Structural Design
- **AE 325** Architectural Engineering Studio 2
- **AE 392/CIVE 392/ENVE 392/GEOE 392** Economics and Life Cycle Cost Analysis
- **AE 399** Seminar
- **CIVE 507** Building Science and Technology
- **WKRPT 400** Work-term Report
- Approved elective

Term 4A (Spring)

- **AE 400** Project Studio 1
- **AE 491** Engineering Law and Ethics
- **AE 498** Seminar
- ~~Three approved electives~~ **Three or four approved electives**

Term 4B (Winter)

- **AE 425** Project Studio 2
- **AE 499** Seminar
- ~~Five approved electives~~ **Five or four approved electives**

Electives

Students are responsible for selecting their own combination of electives, in keeping with their ultimate career objectives after graduation. The combination must satisfy the requirements of the Department of Civil and Environmental Engineering (CEE). This includes having to meet minimum requirements in mathematics, natural sciences, engineering sciences, engineering design, and complementary studies.

Exceptions to the electives and requirements listed in the following sections (and links) require approval of the Architectural Engineering director, or Civil and Environmental Engineering associate chair, undergraduate studies. Some courses of interest may require prerequisite knowledge that is not part of the core curriculum in Architectural Engineering. Students may require extra courses or may need to seek enrolment approval from the course instructor if the prerequisites have not been satisfied.

Complementary Studies Electives

Students are required to complete two Complementary Studies Electives (CSEs) from the [Complementary Studies Course Lists for Engineering](#):

- One course from List A
- One course from List A, C, or D

Natural Science Electives

Students are required to complete one Natural Science Elective (NSE) from the following list:

- **BIOL 130** Introductory Cell Biology
- **BIOL 150** Organismal and Evolutionary Ecology
- **BIOL 240** Fundamentals of Microbiology

- **BIOL 273** Principles of Human Physiology 1
- **CHE 161** Engineering Biology
- **CHEM 209** Introductory Spectroscopy and Structure
- **CHEM 262** Organic Chemistry for Engineering
- **EARTH 221** Introductory Geochemistry
- **EARTH 270** Disasters and Natural Disasters
- **EARTH 281** Geological Impacts on Human Health
- **ENVS 200** Field Ecology
- **GEOG 357** River Management
- **KIN 100** Regional Human Anatomy and **KIN 100L** Regional Human Anatomy Laboratory
- **SCI 206** The Physics of How Things Work
- **SCI 207** Physics, the Universe, and Everything
- **SCI 238** Introductory Astronomy
- **SCI 250** Environmental Geology

Technical Electives

Students are required to complete seven technical electives (TEs) within the following requirements:

- Three TEs must be from List 1
- Two TEs must be from List 2
- The remaining two TEs may be from either List 1, 2, or 3

The Technical Elective lists for Architectural Engineering are provided below. Note that the offering of these courses is contingent upon sufficient demand and/or available teaching resources. There may be courses added and changes made to the content. Special Topics Courses (**AE 495** and **AE 497**) are offered as resources and faculty availability permit. Further information is available from the CEE Undergraduate Office or [CEE website](#).

TE List 1 - Architectural Engineering Technical Electives

- **AE 301** Building Enclosure Systems
- **AE 315** Building Structural Systems
- **AE 405** Building Performance Measurement Lab
- **AE 450** Building Service Systems
- **AE 495** Design Intensive Special Topics in Architectural Engineering
- **AE 572/ME 572** Building Energy Analysis
- **AE 573/ME 573** HVAC Systems, Equipment, and Energy Efficiency
- **ARCH 570** Special Topics in Building Technology and Environmental
- **CIVE 332 Civil Systems and Project Management**
- **ME 436 Welding and Joining Processes**
- **ME 452** HVAC Load Analysis and Design Fundamentals
- **ME 567 Fire Safety Engineering**
- **SYDE 532 Introduction to Complex Systems**

TE List 2 - Engineering Design Intensive Technical Electives

- **ARCH 463** Integrated Environmental Systems
- **CIVE 413** Structural Steel Design
- **CIVE 414** Structural Concrete Design
- **CIVE 415** Structural System Design
- **CIVE 460/ME 574** Engineering Biomechanics
- **CIVE 495** Design Intensive Special Topics in Civil Engineering
- **CIVE 512** Rehabilitation of Structures

- **CIVE 596** Construction Engineering

TE List 3 - Engineering Technical Electives

- **AE 497** Special Topics in Architectural Engineering
- **CIVE 422** Finite Element Analysis
- **CIVE 484/PLAN 484** Physical Infrastructure Planning
- **CIVE 497** Special Topics in Civil Engineering
- **CIVE 505** Structural Dynamics

Specializations

The Faculty of Engineering recognizes two specializations with the Architectural Engineering BAsC degree. Students who satisfy the specialization requirements (courses and grades) will have the specialization designation shown on their transcript and diploma. Specializations are intended to recognize success in a concentration of electives within the Architectural Engineering degree specification. In other words, specializations focus the selection of electives required for the base degree and do not require extra courses.

Each specialization requires students to select TEs with a common theme. Students are responsible for meeting the TE requirements of the Architectural Engineering degree when pursuing a specialization. Each specialization requires the successful completion of a minimum number of TEs specified by the specialization with a minimum average of 60%. Students must declare a specialization for it to be recognized as part of their degree and appear on the transcript and diploma.

The specialization course requirements are provided below.

Building Structures Specialization

The Building Structures Specialization requires a minimum of five TEs from the list below, of which one must be **CIVE 413** or **CIVE 414**.

- From TE List 1:
 - **AE 315** Building Structural Systems
- From TE List 2:
 - **CIVE 413** Structural Steel Design
 - **CIVE 414** Structural Concrete Design
 - **CIVE 415** Structural System Design
 - **CIVE 460/ME 574** Engineering Biomechanics
 - **CIVE 512** Rehabilitation of Structures
 - **CIVE 596** Construction Engineering
- From TE List 3:
 - **CIVE 422** Finite Element Analysis
 - **CIVE 505** Structural Dynamics

Building Systems Specialization

The Building Systems Specialization requires a minimum of four TEs from the list below.

- From TE List 1:
 - **AE 301** Building Enclosure Systems
 - **AE 315** Building Structural Systems
 - **AE 405** Building Performance Measurement Lab
 - **AE 450** Building Service Systems
 - **AE 572/ME 572** Building Energy Analysis

- **AE 573/ME 573** HVAC Systems, Equipment, and Energy Efficiency
- **ME 452** HVAC Load Analysis and Design Fundamentals
- **ME 567 Fire Safety Engineering**

4.3 Biomedical Engineering [for approval]

Summary:

1 - Minor Plan Changes

- a) Designating courses that can be deferred
- b) Removing technical work term reports and adding work-term communication requirement.

2 - Course Changes

- a) Creating new course (BME 400)
- b) Creating new course (BME 544)

Background & Rationale:

1a) Designating courses that can be deferred to accommodate reduced-load students.
1b) Removing work-reports 200, 300 & 400; and in turn, creating a work-term communication requirement. The requirement will include PD 11 to be taken prior to 4A and a required symposium poster.

2a) BME 400 (Work-Term Symposium Poster) will be a required component to be taken in 4A to fulfill the work-term communication requirement. Requesting the change to be retroactive to September 2021 to capture all current students.

2b) BME 544 (Biomedical Measurement and Signal Processing) will replace SYDE 544 in the curriculum within the technical elective course listings. The new course will better align with the BME curriculum and teaching tasks and is a strong complement to the BME technical elective list.

Biomedical Engineering

MARK UP

The Biomedical Engineering Academic Curriculum

The Biomedical Engineering curriculum consists of two course groupings:

1. Compulsory core courses that prepare the student for practice in engineering and comprise 70% to 80% of the course load.
2. Elective courses that comprise 20% to 30% of the course load.
3. **To accommodate a reduced load, electives in 1B, 3A, 4A or 4B or core courses BME 282 (2A), BME 213 (2B), BME 384 (3B) can be taken in a different term. Students are expected to meet with the BME academic advisor to discuss their academic plan.**

The term-by-term academic component of the curriculum is as follows:

Term 1A (Fall)

- **BME 101** Communications in Biomedical Engineering-Written and Oral
- **BME 101L** Communications in Biomedical Engineering-Visualization
- **BME 121** Digital Computation
- **BME 161** Introduction to Biomedical Design
- **BME 181** Physics 1: Statics
- **SYDE 111** Calculus 1
- **SYDE 113** Elementary Engineering Mathematics

Term 1B (Winter)

- BME 102 Seminar
- BME 122 Data Structures and Algorithms
- BME 162 Human Factors in the Design of Biomedical and Health Systems
- BME 186 Chemistry Principles
- SYDE 112 Calculus 2
- SYDE 114 Matrices and Linear Systems
- One Complementary Studies Elective

Term 2A (Fall)

- BME 201 Seminar
- BME 182 Physics 2: Dynamics
- BME 281 Mechanics of Deformable Solids
- BME 281L Mechanics of Deformable Solids Laboratory
- BME 282 Materials Science for Biomedical Engineers
- BME 285 Engineering Biology
- BME 285L Engineering Biology Laboratory
- SYDE 211 Calculus 3

Term 2B (Spring)

- BME 202 Seminar
- BME 213 Statistics and Experimental Design
- BME 252 Linear Systems and Signals
- BME 261 Prototyping, Simulation and Design
- BME 284 Physiological and Biological Systems
- BME 284L Physiology and Anatomy Laboratory
- BME 294 Circuits, Instrumentation, and Measurements
- BME 294L Circuits, Instrumentation, and Measurements Laboratory
- ~~WKRPT 200 Work term Report~~

Term 3A (Winter)

- BME 301 Seminar
- BME 355 Physiological Systems Modelling
- BME 361 Biomedical Engineering Design
- BME 381 Biomedical Engineering Ethics
- BME 393 Digital Systems
- BME 393L Digital Systems Laboratory
- ~~WKRPT 300 Work term Report~~
- One Technical Elective or One Complementary Studies Elective

Term 3B (Fall)

- BME 302 Seminar
- BME 356 Control Systems
- BME 356L Control Systems Laboratory
- BME 362 Biomedical Engineering Design Workshop 1

- **BME 364** Engineering Biomedical Economics
 - **BME 384** Biomedical Transport: Biofluids and Mass Transfer
 - **BME 386** The Physics of Medical Imaging
-

Term 4A (Fall)

- **BME 401** Seminar
 - **BME 411** Optimization and Numerical Methods
 - **BME 461** Biomedical Engineering Design Workshop 2
 - ~~WKRPT 400 Work term Report~~
 - **BME 400 Work-term Symposium Poster**
 - One Complementary Studies Elective
 - Two Technical Electives
-

Term 4B (Winter)

- **BME 402** Seminar
 - **BME 462** Biomedical Engineering Design Workshop 3
 - One Complementary Studies Elective
 - Three Technical Electives
-

Work-term Communication Requirement

Students must complete PD 11 Process for Technical Report Writing as one of their PD electives and BME 400 Work-Term Poster Symposium.

CEAB Requirements

Elective course selections must meet CEAB requirements, including a minimum number of instruction hours in the various CEAB categories. To determine the suitability of elective courses, students should complete the **CEAB planner**. In addition to meeting CEAB requirements, the student's course selections (as reported in their planner) should be logical and defensible. Two planners must be completed and submitted to the director of biomedical engineering, one planner for approval purposes in the student's 2B or 3A term, and one planner for graduation purposes at the end of the student's 4A term.

Students that have combinations of electives that result in a plan that does not meet CEAB criteria will not be permitted to graduate.

Complementary Studies Electives

In addition to the two courses in the core curriculum (**BME 364** and **BME 381**), at least three complementary studies elective courses must be chosen. Only courses noted in Lists A, C, and D in the **Complementary Studies Course Lists for Engineering** are approved complementary studies elective courses. Students must take at least one course from List C. Students may arrange the sequencing of the complementary studies elective courses to suit their academic plan (and any course prerequisites).

Technical Electives

Each student in Biomedical Engineering must complete at least six approved technical electives (TEs) to meet graduation requirements. Students may arrange the sequencing of the technical elective courses to suit their plan (and any course prerequisites).

The Department of Systems Design Engineering offers a wide variety of technical elective courses in the third and fourth year. Biomedical Engineering students are encouraged to design their own elective package to develop expertise in their particular interest area. Approved technical elective courses are available from the Department of Systems Design Engineering (BME and SYDE TEs), from other Engineering departments, and from a wide list of technical courses in the faculties of Science and Mathematics. There are a variety of **technical electives with biomedical content**, but students can also take technical electives on other topics. Only courses from Engineering and Computer Science will contribute towards CEAB hours in the categories of "Engineering Science" and "Engineering Design". Some examples are listed below.

Biomedical Engineering

- **BME 499** Elective Biomedical Research Project
- **BME 540/ME 540** Fundamentals in Neural and Rehabilitation Engineering
- **BME 544 Biomedical Measurement and Signal Processing**
- **BME 550** Sports Engineering
- **BME 551** Biomechanics of Human Movement
- **BME 581** Ultrasound in Medicine and Biology
- **BME 587** Special Topics in Biomedical Signals
- **BME 588** Special Topics in Biomechanics
- **BME 589** Special Topics in Biomedical Devices

Civil Engineering

- **CIVE 460/ME 574** Engineering Biomechanics

Electrical and Computer Engineering

- **ECE 224** Embedded Microprocessor Systems
- **ECE 252** Systems Programming and Concurrency
- **ECE 350** Real-Time Operating Systems
- **ECE 356** Database Systems
- **ECE 358** Computer Networks
- **ECE 406** Algorithm Design and Analysis
- **ECE 457B** Fundamentals of Computational Intelligence
- **ECE 459** Programming for Performance
- **ECE 484** Digital Control Applications

Management Sciences

- **MSCI 343** Human-Computer Interaction
- **MSCI 432** Production and Service Operations Management
- **MSCI 446** Introduction to Machine Learning
- **MSCI 555** Scheduling: Theory and Practice

Mechanical Engineering

- **ME 574/CIVE 460** Engineering Biomechanics

Mechatronics Engineering

- **MTE 241** Introduction to Computer Structures and Real-Time Systems
- **MTE 325** Microprocessor Systems and Interfacing for Mechatronics Engineering
- **MTE 544** Autonomous Mobile Robots

Systems Design Engineering

- **SYDE 322** Software Design
- **SYDE 334** Applied Statistics
- **SYDE 522** Foundations of Artificial Intelligence
- **SYDE 531** Design Optimization Under Probabilistic Uncertainty
- **SYDE 532** Introduction to Complex Systems
- **SYDE 533** Conflict Resolution
- **SYDE 542** Interface Design
- **SYDE 543** Cognitive Ergonomics
- ~~**SYDE 544** Biomedical Measurement and Signal Processing~~
- **SYDE 548** User Centred Design Methods
- **SYDE 552/BIOL 487** Computational Neuroscience
- **SYDE 553** Advanced Dynamics
- **SYDE 556** Simulating Neurobiological Systems
- **SYDE 572** Introduction to Pattern Recognition
- **SYDE 575** Image Processing
- **SYDE 584** Physiological Systems and Biomedical Design
- **SYDE 599** Special Topics in Systems Design Engineering

Specializations

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Sports Engineering Specialization

The Sports Engineering Specialization consists of five courses, two specific required courses, plus three additional courses drawn from the provided list. Students are also required to do either their capstone design project (**BME 461** or **GENE 403** or **SYDE 461** and **BME 462** or **GENE 404** or **SYDE 462**) or an elective research project (**BME 499**) with a focus on a new sport equipment or training device. The project must be approved by the co-ordinator of the Sports Engineering Specialization. A minimum average of 60% in the five specialization courses and a grade of at least 50% in each of the courses is required. Students who satisfy the requirements for **Options, Specializations and Electives for Engineering Students** will have the appropriate designation shown on their diploma and transcript.

Required courses:

- **BME 550** Sports Engineering
- **BME 551** Biomechanics of Human Movement or **BME 588** Special topics in Biomechanics (topic: Computational Biomechanics)

One of the following, a capstone project or research project with a focus on sports engineering and approved by the specialization co-ordinator:

- **BME 461** Biomedical Engineering Design Workshop 2 and **BME 462** Biomedical Engineering Design Workshop 3
- **BME 499** Elective Biomedical Research Project
- **GENE 403** Interdisciplinary Design Project 1 and **GENE 404** Interdisciplinary Design Project 2
- **SYDE 461** Systems Design Capstone Project 1 and **SYDE 462** Systems Design Capstone Project 2

Any three additional courses from the following list must also be taken:

- **BME 499** Elective Biomedical Research Project (requires approval from the co-ordinator of the Sports Engineering Specialization)
- **BME 544 Biomedical Measurement and Signal Processing**
- **BME 588** Special Topics in Biomechanics
- **CIVE 460/ME 574** Engineering Biomechanics
- **ECE 417** or **SYDE 575** Image Processing
- **KIN 340** Musculoskeletal Injuries in Sport and Activity
- **ME 362** Fluid Mechanics 2
- **ME 533** Non-metallic and Composite Materials
- **ME 559** Finite Element Methods
- ~~**SYDE 544 Biomedical Measurement and Signal Processing**~~
- **SYDE 553** Advanced Dynamics

4.4 Chemical Engineering [for approval]

1 - Minor Plan Changes

Update List 2 (Materials and Manufacturing Processes)

2 - Course Changes

- a) Add a new course (CHE 560)
- b) Update prerequisites

Background & Rationale:

1) Adding the proposed new cross-list course CHE 560 to the list of elective choice for accuracy.

2a) Add a new course 560 (Nanomedicine and Nanobiotechnology) to the undergraduate calendar, cross-listed with the existing course NE 481 (Nanomedicine and Nanobiotechnology). NE 481 is already on the list of CHE technical electives. CHE students are required to take 4 technical electives, two of which must be CHE 5xx. Creating CHE 560 allows chemical students to take this course as one of the required 5xx technical electives, giving them more flexibility in completing this requirement.

2b) Adding CHE 560 as a prerequisite for CHE 561. NE 488 (Biomaterials and Biomedical Design) is cross-listed with CHE 561 and has a prerequisite of NE 481 (now cross-listed with CHE 560). The chemical courses should have comparable prerequisites so that students are adequately prepared to be successful in the course.

Chemical Engineering

MARK UP

The Chemical Engineering Academic Curriculum

Chemical Engineering is a co-operative education plan. The academic curriculum comprises a set of core and elective courses taken in prescribed terms. The rules related to progress through the plan, and other important rules and regulations, can be found in the [Engineering and Architecture](#) and [Examinations and Promotions](#) sections.

Further details of the co-operative education requirements can be found in the [Co-operative Education Program Regulations](#) and the Faculty of Engineering [Work Terms](#) sections.

The term-by-term academic component of the curriculum is as follows:

Term 1A (Fall)

- [CHE 100](#) Chemical Engineering Concepts 1
- [CHE 102](#) Chemistry for Engineers
- [CHE 120](#) Computer Literacy and Programming for Chemical Engineers
- [CHE 180](#) Chemical Engineering Design Studio 1
- [MATH 115](#) Linear Algebra for Engineering
- [MATH 116](#) Calculus 1 for Engineering

Term 1B (Winter Stream 8D/Spring Stream 4D)

- [CHE 101](#) Chemical Engineering Concepts 2
- [CHE 161](#) Engineering Biology
- [CHE 181](#) Chemical Engineering Design Studio 2

- **MATH 118** Calculus 2 for Engineering
- **PHYS 115** Mechanics
- Communication Complementary Studies Elective

Term 2A (Fall Stream 8D/Winter Stream 4D)

- **CHE 200** Equilibrium Stage Operations
- **CHE 220** Process Data Analysis
- **CHE 230** Physical Chemistry 1
- **CHE 290** Chemical Engineering Lab 1
- **CHEM 262** Organic Chemistry for Engineering
- **CHEM 262L** Organic Chemistry Laboratory for Engineering Students
- **MATH 217** Calculus 3 for Chemical Engineering

Term 2B (Spring Stream 8D/Fall Stream 4D)

- **CHE 211** Fluid Mechanics
- **CHE 225** Strategies for Process Improvement and Product Development
- **CHE 231** Physical Chemistry 2
- **CHE 241** Materials Science and Engineering
- **CHE 291** Chemical Engineering Lab 2
- **MATH 218** Differential Equations for Engineers

Term 3A (Winter Stream 8D/Spring Stream 4D)

- **CHE 312** Mathematics of Heat and Mass Transfer
- **CHE 314** Chemical Reaction Engineering
- **CHE 322** Numerical Methods for Process Analysis and Design
- **CHE 330** Chemical Engineering Thermodynamics
- **CHE 390** Chemical Engineering Lab 3
- **MSCI 261** Engineering Economics: Financial Management for Engineers

Term 3B (Fall Stream 4D/Winter Stream 8D)

- **CHE 313** Applications of Heat and Mass Transfer
- **CHE 331** Electrochemical Engineering
- **CHE 341** Introduction to Process Control
- **CHE 361** Bioprocess Engineering
- **CHE 383** Chemical Engineering Design Workshop
- One Technical Elective or Complementary Studies Elective

Term 4A (Fall)

- **CHE 480** Process Analysis and Design
- **CHE 482** Group Design Project
- **CHE 490** Chemical Engineering Lab 4
- **CHE 450** Technical Work-term Report
- Three Technical Electives or Complementary Studies Electives

Term 4B (Winter)

- CHE 483 Group Design Project and Symposium
- CHE 491 Chemical Engineering Lab 5
- Four Technical Electives or Complementary Studies Electives

Complementary Studies Electives

Five Complementary Studies Electives (CSEs) must be taken, selected from the **Complementary Studies Course Lists for Engineering**, Lists A, C, and D, that satisfy the following criteria:

- One communication course (CSE)
- At least one CSE selected from List A
- At least one CSE selected from List C

Communication Course

One communication course (CSE) must be taken from the following list (usually in the 1B term):

- COMMST 100 Interpersonal Communication
- COMMST 223 Public Speaking
- EMLS 101R Oral Communications for Academic Purposes
- EMLS 102R Clear Communication in English Writing
- ENGL 109 Introduction to Academic Writing
- ENGL 129R/EMLS 129R Written Academic English

Completing a communication course (CSE) satisfies the **Undergraduate Communication Requirement**. If this is not achieved before the end of the 2A term then it will result in a promotion decision of May Not Proceed.

Technical Work-term Reports

Two technical work-term reports are required. The first is completed as part of **PD 11 Processes for Technical Report Writing** which must be selected as a PD elective, and the second through the **CHE 450 Technical Work-term Report** course.

Ethics and Equity Milestone

This degree milestone must be met by all graduating Chemical Engineering students by either completing one course from the following list (can be taken as a CSE):

- PHIL 215/ARBUS 202 Professional and Business Ethics
- PHIL 219J Practical Ethics
- PHIL 315 Ethics and The Engineering Profession

or by completing **PD 22 Professionalism and Ethics in Engineering Practice** (can be taken as a PD elective).

Technical Electives

A total of four Technical Electives (TEs) courses must be taken, selected from the following lists. The lists are organized in three main thematic areas and students selecting all four TEs

from the same list may choose to register for a specialization (further information below). Only one non-CHE course (i.e., from other departments) is permitted if **CHE 499** is chosen. Otherwise, students may select up to two non-CHE TEs. Non-CHE courses will likely require permission of the instructor and/or other prerequisites. In brackets are recommended minimum levels that CHE students should be enrolled in before attempting a given course. Variations from this course selection list must be approved by the Department.

List 1 - Energy and Environmental Systems and Processes

- **CHE 499** Elective Research Project
- **CHE 500** Special Topics in Chemical Engineering
- **CHE 514** Fundamentals of Petroleum Production
- **CHE 516** Energy Systems Engineering
- **CHE 520** Process Flowsheet Analysis
- **CHE 565/BIOL 349** Synthetic Biology Project Design
- **CHE 571** Industrial Ecology
- **CHE 572** Air Pollution Control
- **CHE 574** Industrial Wastewater Pollution Control
- **EARTH 458** Physical Hydrogeology
- **EARTH 459** Chemical Hydrogeology
- **ENVE 376** Biological Processes
- **ENVE 573** Contaminant Transport
- **ENVE 577** Engineering for Solid Waste Management
- **ME 452** HVAC Load Analysis and Design Fundamentals
- **ME 459** Energy Conversion
- **ME 571** Air Pollution

List 2 - Materials and Manufacturing Processes

- **CHE 499** Elective Research Project
- **CHE 500** Special Topics in Chemical Engineering
- **CHE 520** Process Flowsheet Analysis
- **CHE 541** Introduction to Polymer Science and Properties
- **CHE 543** Polymer Production: Polymer Reaction Engineering
- **CHE 560 Nanomedicine and Nanobiotechnology**
- **CHE 561/NE 488** Biomaterials and Biomedical Design
- **CHE 562** Advanced Bioprocess Engineering
- **CHE 564** Food Process Engineering
- **CHE 565/BIOL 349** Synthetic Biology Project Design
- **CHE 571** Industrial Ecology
- **ME 435** Industrial Metallurgy
- **ME 531** Physical Metallurgy Applied to Manufacturing
- **ME 533** Non-metallic and Composite Materials
- **MSCI 432** Production and Service Operations Management
- **MSCI 551** Quality Management and Control
- **NE 352** Surfaces and Interfaces
- ~~**NE 481 Nanomedicine and Nanobiotechnology**~~

List 3 - Chemical Process Modelling, Optimization, and Control

- **CHE 499** Elective Research Project
- **CHE 500** Special Topics in Chemical Engineering
- **CHE 520** Process Flowsheet Analysis
- **CHE 521** Process Optimization
- **CHE 522** Advanced Process Dynamics and Control
- **CHE 524** Process Control Laboratory

- **CHE 565/BIOL 349** Synthetic Biology Project Design
- **EARTH 456** Numerical Methods in Hydrogeology
- **ME 362** Fluid Mechanics 2
- **ME 559** Finite Element Methods
- **ME 566** Computational Fluid Dynamics for Engineering Design
- **MSCI 332** Deterministic Optimization Models and Methods
- **MSCI 431** Stochastic Models and Methods
- **MSCI 432** Production and Service Operations Management
- **MSCI 551** Quality Management and Control
- **NE 451** Simulation Methods
- **SYDE 531** Design Optimization Under Probabilistic Uncertainty

Information for all undergraduate courses, including **Chemical Engineering**, can be found in the Course Descriptions section of this Calendar.

Specializations

The Faculty of Engineering recognizes three designated specializations within the BAsC degree in Chemical Engineering:

- The Energy and Environmental Systems and Processes Specialization
- The Materials and Manufacturing Processes Specialization
- The Chemical Process Modelling, Optimization and Control Specialization

Students interested in pursuing one of these specializations must take four required technical elective courses from the corresponding list of approved technical electives (List 1, List 2, or List 3). A minimum average of 60% in the four specialization courses and a grade of at least 50% in each of the four courses is required. Students who satisfy the requirements for **Options, Specializations and Electives for Engineering Students** will have the appropriate designation shown on their diploma and transcript.

4.5 Civil Engineering [for approval]

1 - Minor Plan Changes

Revising the number of electives in 4B

2 - Course Changes

Update prerequisites (CIVE 460, 596, 332)

Background & Rationale:

1. Revising the number of electives in 4B will provide reduced load flexibility if they had excess credits in 4B. Students could have obtained excess credits by previously overloading an academic, taking a course while on coop, switching programs, exchange term, or a desire to pursue accelerated maters. This change would allow civil engineering students to take two electives in 4B. Rule #1's longstanding clause for elective reduced load allows students to drop one elective; therefore, -1 elective from term definition; -1 elective from rule #1 = 2 electives. 2 electives + capstone = 3 courses overall.

2. Updating CIVE 460, 596 & 332 to include Architectural Engineering cross-listed courses for easier student enrollment.

Civil Engineering

MARK UP

The Civil Engineering Academic Curriculum

The Civil Engineering academic curriculum is detailed in the following sections. A total of eleven approved electives must be completed:

- Three Complementary Studies Electives
- One Natural Science Elective
- Seven Technical Electives

The term-by-term academic component of the curriculum is as follows:

Term 1A (Fall)

- CHE 102 Chemistry for Engineers
- CIVE 100 Civil Engineering Concepts
- CIVE 104 Mechanics 1
- CIVE 115/ENVE 115/GEOE 115 Linear Algebra
- COMMST 191/ENGL 191 Communication in the Engineering Profession
- MATH 116 Calculus 1 for Engineering

Term 1B (Winter)

- CIVE 105 Mechanics 2
- CIVE 121/ENVE 121/GEOE 121 Computational Methods
- CIVE 123/AE 123/ENVE 123/GEOE 123 Electrical Circuits and Instrumentation
- CIVE 153/ENVE 153/GEOE 153 Earth Engineering
- CIVE 199 Seminar
- MATH 118 Calculus 2 for Engineering

Term 2A (Fall)

- CIVE 204 Solid Mechanics 1
- CIVE 221/GEOE 221 Advanced Calculus
- CIVE 224 Probability and Statistics
- CIVE 241 Transport Principles and Applications
- CIVE 265 Structure and Properties of Materials
- CIVE 298 Seminar

Term 2B (Spring)

- CIVE 205 Solid Mechanics 2
- CIVE 222 Differential Equations
- CIVE 230 Engineering and Sustainable Development
- CIVE 280 Fluid Mechanics
- CIVE 299 Seminar
- CIVE 392/AE 392/ENVE 392/GEOE 392 Economics and Life Cycle Cost Analysis

Term 3A (Winter)

- CIVE 303 Structural Analysis
- CIVE 332 Civil Systems and Project Management
- CIVE 341 Transportation Engineering Applications
- CIVE 353/GEOE 353 Geotechnical Engineering 1
- CIVE 382/ENVE 382 Hydrology and Open Channel Flow
- CIVE 398 Seminar
- WKRPT 200 Work-term Report
- Approved elective

Term 3B (Fall)

- CIVE 310 Introduction to Structural Design
- CIVE 375 Environmental Engineering Principles
- CIVE 399 Seminar
- WKRPT 300 Work-term Report
- Three approved electives

Term 4A (Spring)

- CIVE 400 Civil Engineering Design Project 1
- CIVE 491 Engineering Law and Ethics
- CIVE 498 Seminar
- WKRPT 400 Work-term Report
- Three approved electives

Term 4B (Winter)

- CIVE 401 Civil Engineering Design Project 2
- CIVE 499 Seminar

- ~~Four approved electives~~ Four or three* approved electives (* Students who have taken excess elective(s) in previous terms may take three electives in 4B provided they satisfy their program elective requirements.)

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4.6 Computer Engineering [for approval]

1 - Minor Plan Changes

- a) Update ethics requirement
- b) Update Natural Science Elective list

2 - Major Plan Changes

- a) ~~Create a Quantum Engineering Specialization~~

Secretary Note: Major Plan Change for consideration as part of the regular agenda

3 - Course Changes

- a) Inactivating courses (ECE 103, 155, 204A, 242, 254, 361, 405)
- b) Updating course prerequisites (ECE 124, 203, 222, 224, 252, 320, 327, 350, 351, 356, 406, 409, 414, 423, 451, 452, 453, 454, 455, 457A, 457B, 458, 459, 498A)
- c) Create new courses (ECE 305, ECE 405A, ECE 405B, ECE 405C, ECE 405D)

Background & Rationale:

1a) Currently, students must choose an ethics requirement course from a list of courses as part of their PD (PD22) or take PHIL 315, which is only offered in Winter terms. By offering PHIL 215 (offered every term either on campus or online), and PHIL 219J, will provide students with more flexibility and choice to complete this requirement.

1b) Updating the Natural Science Elective list to include the removal of CHEM 404 as students no longer meet the requirements due to prerequisite changes; removal of ECE 405 as it is being inactivated and adding ECE 305 (new course).

2a) Creating a Quantum Engineering Specialization to meet the growing demand for education and training in this new and growing area. ECE Undergraduate Studies Committee held February 8, 2023. Department meeting held February 16, 2023. Students active in the program when the new specialization is introduced can declare the specialization.

3a) Inactivating courses that have not been taught in over 5 years with no plans for future teachings. (ECE 103, ECE 155, ECE 204A, ECE 242, ECE 254 & ECE 361). Inactivating ECE 405 as it is being replaced with a new course ECE 305.

3b) Updating ECE 203 prerequisite due to the inactivation of ECE 103. Updating ECE 489A prerequisite to be accurate due to the inactivation of ECE 390 previously and not currently reflective of the previous change. ECE 414 prerequisite also being updated to be accurate due to previous change of ECE 307 replacing ECE 306. With the recent approval of courses being added to the Computing Option, Computer Engineering Option and Software Engineering Option lists, the demand for specific ECE courses has increased; therefore, updating these ECE course prerequisites will reduce administrative burden as well as make it easier for students to add these courses. (ECE 124, 222, 224, 252, 320, 327, 350, 351, 356, 406, 409, 423, 451, 452, 453, 454, 455, 457A, 457B, 458, and 459).

3c) Creating new courses required for the Quantum Engineering Specialization. (ECE 305, ECE 405A, ECE 405B, ECE 405C, ECE 405D)

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Complementary Studies Electives

Students must complete three complementary studies electives (CSEs) from the [Complementary Studies Course Lists for Engineering](#). These are in addition to those courses that are part of the core curriculum and contain complementary studies material, such as [COMMST 192/ENGL 192](#), [ECE 190](#), [ECE 192](#), and the Professional Development (PD) sequence. The three CSE courses are to be chosen according to the following constraints:

- Two courses from List C
- One course from any of List A, List C, or List D

Ethics Requirement

~~To meet the Ethics Requirement, students must pass one of [PD 22](#) or [PHIL 315](#). PHIL 315 satisfies both the ethics requirement and one of the List C CSE requirements described above.~~

Students can complete the Ethics requirement by either completing one course from the following list (can also count as a List C CSE):

- [PHIL 215/ARBUS 202 Professional and Business Ethics](#)
- [PHIL 219J Practical Ethics](#)
- [PHIL 315 Ethics and The Engineering Profession](#)

Or by completing [PD 22 Professionalism and Ethics in Engineering Practice](#) (can be taken as a PD elective).

Natural Science Electives

Students are required to complete two natural science electives (NSEs) ~~and are responsible for ensuring they meet the minimum academic units~~. The two NSE courses must be primarily concerned with natural science and are in addition to the science components of the core curriculum, such as [ECE 105](#), [ECE 106](#), and [ECE 109](#).

- [BIOL 110](#) Biodiversity, Biomes, and Evolution
- [BIOL 130](#) Introductory Cell Biology and [BIOL 130L](#) Cell Biology Laboratory
- [BIOL 150](#) Organismal and Evolutionary Ecology
- [BIOL 165](#) Diversity of Life
- [BIOL 220](#) Introduction to Plant Structure and Function
- [BIOL 211](#) Introductory Vertebrate Zoology
- [BIOL 239](#) Genetics
- [BIOL 240](#) Fundamentals of Microbiology and [BIOL 240L](#) Microbiology Laboratory
- [BIOL 241](#) Introduction to Applied Microbiology
- [BIOL 273](#) Principles of Human Physiology 1
- [BIOL 373](#) Principles of Human Physiology 2 and [BIOL 373L](#) Human Physiology Laboratory
- [CHE 102](#) Chemistry for Engineers
- [CHE 161](#) Engineering Biology
- [CHEM 123](#) General Chemistry 2 and [CHEM 123L](#) General Chemistry Laboratory 2
- [CHEM 209](#) Introductory Spectroscopy and Structure

- [CHEM 237](#) Introductory Biochemistry, and [CHEM 237L](#) Introductory Biochemistry Laboratory
- [CHEM 254](#) Introductory Chemical Thermodynamics
- [CHEM 262](#) Organic Chemistry for Engineering and [CHEM 262L](#) Organic Chemistry Laboratory for Engineering Students
- [CHEM 266](#) Basic Organic Chemistry 1
- [CHEM 356](#) Introductory Quantum Mechanics
- ~~[CHEM 404](#) Physiochemical Aspects of Natural Waters~~
- [EARTH 121](#) Introductory Earth Sciences
- [EARTH 122](#) Introductory Environmental Sciences
- [EARTH 123](#) Introductory Hydrology
- [EARTH 221](#) Introductory Geochemistry
- [EARTH 270](#) Disasters and Natural Hazards
- [EARTH 281](#) Geological Impacts on Human Health
- [ECE 231](#) Semiconductor Physics and Devices
- [ECE 305 Introduction to Quantum Mechanics](#)
- [ECE 403](#) Thermal Physics
- [ECE 404](#) Geometrical and Physical Optics
- ~~[ECE 405](#) Introduction to Quantum Mechanics~~
- [ENVE 275](#) Environmental Chemistry
- [ENVS 200](#) Field Ecology
- [NE 222](#) Organic Chemistry for Nanotechnology Engineers
- [PHYS 124](#) Modern Physics
- [PHYS 233](#) Introduction to Quantum Mechanics
- [PHYS 234](#) Quantum Physics 1
- [PHYS 263](#) Classical Mechanics and Special Relativity
- [PHYS 275](#) Planets
- [PHYS 280/BIOL 280](#) Introduction to Biophysics
- [PHYS 334](#) Quantum Physics 2
- [PHYS 335](#) Condensed Matter Physics
- [PHYS 375](#) Stars
- [PHYS 380](#) Molecular and Cellular Biophysics
- [PSYCH 207](#) Cognitive Processes
- [PSYCH 261](#) Physiological Psychology
- [PSYCH 306](#) Perception
- [SCI 238](#) Introductory Astronomy
- [SCI 250](#) Environmental Geology

Technical Electives

Students are required to complete a total of eight technical electives (TEs), subject to the following conditions:

- All of the technical courses from the 3B term (i.e., [ECE 313](#), [ECE 320](#), [ECE 331](#), [ECE 351](#), [ECE 356](#), [ECE 358](#), [ECE 360](#), and [ECE 373](#)) count as TEs. At least three of these courses must be taken in the 3B term, as specified in the curriculum above.
- At least three TEs must be courses chosen from [ECE 406](#) through [ECE 495](#) or [ECE 499](#), normally taken during the 4A and 4B terms. A list of current 4A and 4B TEs is provided below.
- At least one TE, to a maximum of two, must be from another engineering (other than Electrical or Computer Engineering) plan; such courses must have sufficiently advanced engineering science or engineering design content to be allowed, and must be approved by the ECE Undergraduate Office. Some courses of interest may require prerequisite knowledge that is not part of the core curriculum in Computer Engineering. Students may require extra courses or may need to seek enrolment approval from the course instructor if the prerequisite knowledge was acquired by other means.

- The following courses are offered in the core curriculum in Electrical Engineering but are considered TE courses for Computer Engineering: [ECE 260](#), [ECE 340](#), and [ECE 375](#). Some of these courses have prerequisites that must be met in order to enrol.
- In all terms, elective availability is subject to scheduling constraints.

The following TE courses are normally offered for the spring (4A) term. The list is subject to change from year to year.

- [ECE 414](#) Wireless Communications
- [ECE 433](#) Fabrication Technologies for Micro and Nano Devices
- [ECE 445](#) Integrated Digital Electronics
- [ECE 452/CS 446](#) Software Design and Architectures
- [ECE 454](#) Distributed Computing
- [ECE 455](#) Embedded Software
- [ECE 457A](#) Co-operative and Adaptive Algorithms
- [ECE 457C](#) Reinforcement Learning
- [ECE 458](#) Computer Security
- [ECE 462](#) Electrical Distribution Systems
- [ECE 463](#) Design and Applications of Power Electronic Converters
- [ECE 475](#) Radio-Wave Systems
- [ECE 481](#) Digital Control Systems
- [ECE 486](#) Robot Dynamics and Control
- [ECE 493](#) Special Topics in Electrical and Computer Engineering (see Note 3)

The following TE courses are normally offered for the winter (4B) term. The list is subject to change from year to year.

- [ECE 406](#) Algorithm Design and Analysis
- [ECE 409](#) Cryptography and System Security
- [ECE 416](#) Advanced Topics in Networking
- [ECE 417](#) Image Processing
- [ECE 423](#) Embedded Computer Systems
- [ECE 432](#) Radio Frequency Integrated Devices and Circuits
- [ECE 444](#) Integrated Analog Electronics
- [ECE 451/CS 445](#) Software Requirements Specification and Analysis
- [ECE 453/CS 447](#) Software Testing, Quality Assurance, and Maintenance
- [ECE 457B](#) Fundamentals of Computational Intelligence
- [ECE 459](#) Programming for Performance
- [ECE 464](#) High Voltage Engineering and Power System Protection
- [ECE 467](#) Power Systems Analysis, Operations, and Markets
- [ECE 474](#) Radio and Wireless Systems
- [ECE 477](#) Photonic Devices and Systems
- [ECE 488](#) Multivariable Control Systems
- [ECE 493](#) Special Topics in Electrical and Computer Engineering (see Note 3)
- [ECE 495](#) Autonomous Vehicle

The following project elective is offered every term. Students may take it, at most, once as a TE course.

- [ECE 499](#) Engineering Project

Communications and Signal Processing Specialization

Students interested in pursuing this Specialization must achieve a minimum average of 60% in the specialization courses, and a minimum grade of 50% in each of the courses. Students who satisfy the requirements for Faculty [Options, Specializations and Electives for](#)

Engineering Students will have the appropriate designation shown on their diploma and transcript.

Required courses:

- [ECE 313](#) Digital Signal Processing
- [ECE 318](#) Communication Systems

Any three courses from the following list:

- [ECE 358](#) Computer Networks
- [ECE 414](#) Wireless Communications
- [ECE 416](#) Advanced Topics in Networking
- [ECE 417](#) Image Processing
- [ECE 474](#) Radio and Wireless Systems

Quantum Engineering Specialization

Student interested in pursuing this Specialization must achieve a minimum average of 60% in the specialization courses, and a minimum grade of 50% in each of the courses. Students who satisfy the requirements for Faculty Options, Specializations and Electives for Engineering Students will have the appropriate designation shown on their diploma and transcript.

Students need to complete:

- [ECE 305 Introduction to Quantum Mechanics](#)

plus 3 courses from the list below:

- [ECE 405A Quantum Info Processing Devices](#)
- [ECE 405B Experimental Quantum Engineering](#)
- [ECE 405C Quantum Computing](#)
- [ECE 405D Superconducting Quantum Circuits](#)

4.7 Electrical Engineering [for approval]

1 - Minor Plan Changes

- a) Update ethics requirement
- b) Update Natural Science Elective list

2 - Major Plan Changes

- a) ~~Create a Quantum Engineering Specialization~~

Secretary Note: Major Plan Change for consideration as part of the regular agenda

3 - Course Changes

- a) Inactivating courses (ECE 103, 155, 204A, 242, 254, 361, 405)
- b) Updating course prerequisites (ECE 124, 203, 222, 224, 252, 320, 327, 350, 351, 356, 406, 409, 414, 423, 451, 452, 453, 454, 455, 457A, 457B, 458, 459, 498A)
- c) Create new courses (ECE 305, ECE 405A, ECE 405B, ECE 405C, ECE 405D)

Background & Rationale:

1a) Currently, students must choose an ethics requirement course from a list of courses as part of their PD (PD22) or take PHIL 315, which is only offered in Winter terms. By offering PHIL 215 (offered every term either on campus or online), and PHIL 219J, will provide students with more flexibility and choice to complete this requirement.

1b) Updating the Natural Science Elective list to include the removal of CHEM 404 as students no longer meet the requirements due to prerequisite changes; removal of ECE 405 as it is being inactivated and adding ECE 305 (new course).

2a) Creating a Quantum Engineering Specialization to meet the growing demand for education and training in this new and growing area. ECE Undergraduate Studies Committee held February 8, 2023. Department meeting held February 16, 2023. Students active in the program when the new specialization is introduced can declare the specialization.

3a) Inactivating courses that have not been taught in over 5 years with no plans for future teachings. (ECE 103, ECE 155, ECE 204A, ECE 242, ECE 254 & ECE 361). Inactivating ECE 405 as it is being replaced with a new course ECE 305.

3b) Updating ECE 203 prerequisite due to the inactivation of ECE 103. Updating ECE 489A prerequisite to be accurate due to the inactivation of ECE 390 previously and not currently reflective of the previous change. ECE 414 prerequisite also being updated to be accurate due to previous change of ECE 307 replacing ECE 306. With the recent approval of courses being added to the Computing Option, Computer Engineering Option and Software Engineering Option lists, the demand for specific ECE courses has increased; therefore, updating these ECE course prerequisites will reduce administrative burden as well as make it easier for students to add these courses. (ECE 124, 222, 224, 252, 320, 327, 350, 351, 356, 406, 409, 423, 451, 452, 453, 454, 455, 457A, 457B, 458, and 459).

3c) Creating new courses required for the Quantum Engineering Specialization. (ECE 305, ECE 405A, ECE 405B, ECE 405C, ECE 405D)

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Complementary Studies Electives

Students must complete three complementary studies electives (CSEs) from the [Complementary Studies Course Lists for Engineering](#). These are in addition to those courses that are part of the core curriculum and contain complementary studies material, such as [COMMST 192/ENGL 192](#), [ECE 190](#), [ECE 192](#), and the Professional Development (PD) sequence. The three CSE courses are to be chosen according to the following constraint:

- Two courses from List C
- One course from any of List A, List C, or List D

Ethics Requirement

~~To meet the Ethics Requirement, students must pass one of [PD 22](#) or [PHIL 315](#). PHIL 315 satisfies both the ethics requirement and one of the List C CSE requirements described above.~~

Students can complete the Ethics requirement by either completing one course from the following list (can also count as a List C CSE):

- [PHIL 215/ARBUS 202 Professional and Business Ethics](#)
- [PHIL 219J Practical Ethics](#)
- [PHIL 315 Ethics and The Engineering Profession](#)

Or by completing [PD 22 Professionalism and Ethics in Engineering Practice](#) (can be taken as a PD elective).

Natural Science Electives

Students are required to complete two natural science electives (NSEs) ~~and are responsible for ensuring they meet the minimum academic units~~. The two NSE courses must be primarily concerned with natural science and are in addition to the science components of the core curriculum, such as [ECE 105](#), [ECE 106](#), [ECE 109](#), and [ECE 231](#).

- [BIOL 110](#) Biodiversity, Biomes, and Evolution
- [BIOL 130](#) Introductory Cell Biology and [BIOL 130L](#) Cell Biology Laboratory
- [BIOL 150](#) Organismal and Evolutionary Ecology
- [BIOL 165](#) Diversity of Life
- [BIOL 211](#) Introductory Vertebrate Zoology
- [BIOL 220](#) Introduction to Plant Structure and Function
- [BIOL 239](#) Genetics
- [BIOL 240](#) Fundamentals of Microbiology and [BIOL 240L](#) Microbiology Laboratory
- [BIOL 241](#) Introduction to Applied Microbiology
- [BIOL 273](#) Principles of Human Physiology 1
- [BIOL 373](#) Principles of Human Physiology 2 and [BIOL 373L](#) Human Physiology Laboratory
- [CHE 102](#) Chemistry for Engineers
- [CHE 161](#) Engineering Biology
- [CHEM 123](#) General Chemistry 2 and [CHEM 123L](#) General Chemistry Laboratory 2
- [CHEM 209](#) Introductory Spectroscopy and Structure

- [CHEM 237](#) Introductory Biochemistry and [CHEM 237L](#) Introductory Biochemistry Laboratory
- [CHEM 254](#) Introductory Chemical Thermodynamics
- [CHEM 262](#) Organic Chemistry for Engineering and [CHEM 262L](#) Organic Chemistry Laboratory for Engineering Students
- [CHEM 266](#) Basic Organic Chemistry 1
- [CHEM 356](#) Introductory Quantum Mechanics
- ~~[CHEM 404](#) Physiochemical Aspects of Natural Waters~~
- [EARTH 121](#) Introductory Earth Sciences
- [EARTH 122](#) Introductory Environmental Sciences
- [EARTH 123](#) Introductory Hydrology
- [EARTH 221](#) Introductory Geochemistry
- [EARTH 270](#) Disasters and Natural Hazards
- [EARTH 281](#) Geological Impacts on Human Health
- [ECE 305 Introduction to Quantum Mechanics](#)
- [ECE 403](#) Thermal Physics
- [ECE 404](#) Geometrical and Physical Optics
- ~~[ECE 405](#) Introduction to Quantum Mechanics~~
- [ENVE 275](#) Environmental Chemistry
- [ENVS 200](#) Field Ecology
- [NE 222](#) Organic Chemistry for Nanotechnology Engineers
- [PHYS 124](#) Modern Physics
- [PHYS 233](#) Introduction to Quantum Mechanics
- [PHYS 234](#) Quantum Physics 1
- [PHYS 263](#) Classical Mechanics and Special Relativity
- [PHYS 275](#) Planets
- [PHYS 280/BIOL 280](#) Introduction to Biophysics
- [PHYS 334](#) Quantum Physics 2
- [PHYS 335](#) Condensed Matter Physics
- [PHYS 375](#) Stars
- [PHYS 380](#) Molecular and Cellular Biophysics
- [PSYCH 207](#) Cognitive Processes
- [PSYCH 261](#) Physiological Psychology
- [PSYCH 306](#) Perception
- [SCI 238](#) Introductory Astronomy
- [SCI 250](#) Environmental Geology

Technical Electives

Students are required to complete a total of eight technical electives (TEs), subject to the following conditions:

- All of the technical courses from the 3B term (i.e., [ECE 313](#), [ECE 320](#), [ECE 331](#), [ECE 351](#), [ECE 356](#), [ECE 358](#), [ECE 360](#), and [ECE 373](#)) count as TEs. At least three of these courses must be taken in the 3B term, as specified in the curriculum table above.
- At least three TEs must be courses chosen from [ECE 406](#) through [ECE 495](#) or [ECE 499](#), normally taken during the 4A and 4B terms. A list of current 4A and 4B TEs is provided below.
- At least one TE, to a maximum of two, must be from another engineering (other than Electrical or Computer Engineering) plan; such courses must have sufficiently advanced engineering science or engineering design content to be allowed, and must be approved by the ECE Undergraduate Office. Some courses of interest may require prerequisite knowledge that is not part of the core curriculum in Electrical Engineering. Students may require extra courses or may need to seek enrolment approval from the course instructor if the prerequisite knowledge was acquired by other means.
- The following courses are offered in the core curriculum in Computer Engineering but are considered TE courses for Electrical Engineering: [ECE 224](#), [ECE 252](#), [ECE 327](#),

and [ECE 350](#). Some of these courses have prerequisites that must be met in order to enrol.

- In all terms, elective availability is subject to scheduling constraints.

The following TE courses are normally offered for the spring (4A) term. The list is subject to change from year to year.

- [ECE 414](#) Wireless Communications
- [ECE 433](#) Fabrication Technologies for Micro and Nano Devices
- [ECE 445](#) Integrated Digital Electronics
- [ECE 452/CS 446](#) Software Design and Architectures
- [ECE 454](#) Distributed Computing
- [ECE 455](#) Embedded Software
- [ECE 457A](#) Co-operative and Adaptive Algorithms
- [ECE 457C](#) Reinforcement Learning
- [ECE 458](#) Computer Security
- [ECE 462](#) Electrical Distribution Systems
- [ECE 463](#) Design and Applications of Power Electronic Converters
- [ECE 475](#) Radio-Wave Systems
- [ECE 481](#) Digital Control Systems
- [ECE 486](#) Robot Dynamics and Control
- [ECE 493](#) Special Topics in Electrical and Computer Engineering (see Note 3)

The following TE courses are normally offered for the winter (4B) term. The list is subject to change from year to year.

- [ECE 406](#) Algorithm Design and Analysis
- [ECE 409](#) Cryptography and System Security
- [ECE 416](#) Advanced Topics in Networking
- [ECE 417](#) Image Processing
- [ECE 423](#) Embedded Computer Systems
- [ECE 432](#) Radio Frequency Integrated Devices and Circuits
- [ECE 444](#) Integrated Analog Electronics
- [ECE 451/CS 445](#) Software Requirements Specification and Analysis
- [ECE 453/CS 447](#) Software Testing, Quality Assurance and Maintenance
- [ECE 457B](#) Fundamentals of Computational Intelligence
- [ECE 459](#) Programming for Performance
- [ECE 464](#) High Voltage Engineering and Power System Protection
- [ECE 467](#) Power Systems Analysis, Operations and Markets
- [ECE 474](#) Radio and Wireless Systems
- [ECE 477](#) Photonic Devices and Systems
- [ECE 488](#) Multivariable Control Systems
- [ECE 493](#) Special Topics in Electrical and Computer Engineering (see Note 3)
- [ECE 495](#) Autonomous Vehicle

The following project elective is offered every term. Students may take it, at most, once as a TE course.

- [ECE 499](#) Engineering Project

Communications and Signal Processing Specialization

Students interested in pursuing this Specialization must achieve a minimum average of 60% in the specialization courses, and a minimum grade of 50% in each of the courses. Students who satisfy the requirements for Faculty [Options, Specializations and Electives for Engineering Students](#) will have the appropriate designation shown on their diploma and

transcript.

Required courses:

- [ECE 313](#) Digital Signal Processing
- [ECE 318](#) Communication Systems

Any three courses from the following list:

- [ECE 358](#) Computer Networks
- [ECE 414](#) Wireless Communications
- [ECE 416](#) Advanced Topics in Networking
- [ECE 417](#) Image Processing
- [ECE 474](#) Radio and Wireless Systems

Quantum Engineering Specialization

Student interested in pursuing this Specialization must achieve a minimum average of 60% in the specialization courses, and a minimum grade of 50% in each of the courses. Students who satisfy the requirements for Faculty Options, Specializations and Electives for Engineering Students will have the appropriate designation shown on their diploma and transcript.

Students need to complete:

- **ECE 305 Introduction to Quantum Mechanics**

plus 3 courses from the list below:

- **ECE 405A Quantum Info Processing Devices**
- **ECE 405B Experimental Quantum Engineering**
- **ECE 405C Quantum Computing**
- **ECE 405D Superconducting Quantum Circuits**

4.8 Environmental Engineering [for approval]

Minor Plan Changes

Revising the number of electives in 4B

Background & Rationale:

Revising the number of electives in 4B will provide reduced load flexibility if they had excess credits in 4B. Students could have obtained excess credits by previously overloading an academic, taking a course while on coop, switching programs, exchange term, or a desire to pursue accelerated maters. This change would allow environmental engineering students to take two electives in 4B. Rule #1's longstanding clause for elective reduced load allows students to drop one elective; therefore, -1 elective from term definition; -1 elective from rule #1 = 2 electives. 2 electives + capstone = 3 courses overall.

Environmental Engineering

MARK UP

The Environmental Engineering Academic Curriculum

The Environmental Engineering academic curriculum is detailed in the following sections. A total of nine approved electives must be completed:

- Two Complementary Studies Electives
- Seven Technical Electives

The term-by-term academic component of the curriculum is as follows:

Term 1A (Fall)

- CHE 102 Chemistry for Engineers
- CIVE 104 Mechanics 1
- COMMST 191/ENGL 191 Communication in the Engineering Profession
- ENVE 100/GEOE 100 Environmental and Geological Engineering Concepts
- ENVE 115/CIVE 115/GEOE 115 Linear Algebra
- MATH 116 Calculus 1 for Engineering

Term 1B (Spring)

- CIVE 105 Mechanics 2
- ENVE 121/CIVE 121/GEOE 121 Computational Methods
- ENVE 123/AE 123/CIVE 123/GEOE 123 Electrical Circuits and Instrumentation
- ENVE 153/CIVE 153/GEOE 153 Earth Engineering
- MATH 118 Calculus 2 for Engineering

Term 2A (Winter)

- ENVE 223/GEOE 223 Differential Equations and Balance Laws
- ENVE 224/GEOE 224 Probability and Statistics
- ENVE 275 Environmental Chemistry
- ENVE 280/GEOE 280 Fluid Mechanics
- ENVE 298 Seminar

- **ERS 215** Environmental and Sustainability Assessment 1
-

Term 2B (Fall)

- **BIOL 240** Fundamentals of Microbiology
 - **ENVE 225** Environmental Modelling
 - **ENVE 277** Air Quality Engineering
 - **ENVE 279** Energy and the Environment
 - **ENVE 299** Seminar
 - **ENVE 382/CIVE 382** Hydrology and Open Channel Flow
 - **WKRPT 200** Work-term Report
-

Term 3A (Spring)

- **EARTH 458** Physical Hydrogeology
 - **EARTH 458L** Field Methods in Hydrogeology
 - **ENVE 330** Lab Analysis and Field Sampling Techniques
 - **ENVE 375** Physico-Chemical Processes
 - **ENVE 392/AE 392/CIVE 392/GEOE 392** Economics and Life Cycle Cost Analysis
 - **ENVE 398** Seminar
 - **GEOE 353/CIVE 353** Geotechnical Engineering 1
 - **WKRPT 300** Work-term Report
-

Term 3B (Winter)

- **ENVE 335** Decision Making for Environmental Engineers
 - **ENVE 376** Biological Processes
 - **ENVE 383** Advanced Hydrology and Hydraulics
 - **ENVE 391/GEOE 391** Law and Ethics for Environmental and Geological Engineers
 - **ENVE 399** Seminar
 - Approved elective
-

Term 4A (Fall)

- **ENVE 400** Environmental Engineering Design Project 1
 - **ENVE 498** Seminar
 - **WKRPT 400** Work-term Report
 - Four approved electives
-

Term 4B (Winter)

- **ENVE 401** Environmental Engineering Design Project 2
- **ENVE 499** Seminar
- ~~Four approved electives~~ **Four or three* approved electives** (***Students who have taken excess elective(s) in previous terms may take three electives in 4B provided they satisfy their program elective requirements**)

4.9 Geological Engineering [for approval]

Minor Plan Changes

Revising the number of electives in 4B.

Background & Rationale:

Revising the number of electives in 4B will provide reduced load flexibility if they had excess credits in 4B. Students could have obtained excess credits by previously overloading an academic term, taking a course while on coop, switching programs, exchange term, or a desire to pursue accelerated maters. This change would allow geological engineering students to take two electives in 4B. Rule #1's longstanding clause for elective reduced load allows students to drop one elective; therefore, -1 elective from term definition; -1 elective from rule #1 = 2 electives. 2 electives + capstone = 3 courses overall.

Geological Engineering

MARK-UP COPY

The Geological Engineering Academic Curriculum

The Geological Engineering academic curriculum is detailed in the following sections. A total of nine approved electives must be completed:

- Three Complementary Studies Electives
- Six Technical Electives

The term-by-term academic component of the curriculum is as follows:

Term 1A (Fall)

- [CHE 102](#) Chemistry for Engineers
- [CIVE 104](#) Mechanics 1
- [COMMST 191/ENGL 191](#) Communication in the Engineering Profession
- [GEOE 100/ENVE 100](#) Environmental and Geological Engineering Concepts
- [GEOE 115/CIVE 115/ENVE 115](#) Linear Algebra
- [MATH 116](#) Calculus 1 for Engineering

Term 1B (Spring)

- [CIVE 105](#) Mechanics 2
- [GEOE 121/CIVE 121/ENVE 121](#) Computational Methods
- [GEOE 123/AE 123/CIVE 123/ENVE 123](#) Electrical Circuits and Instrumentation
- [GEOE 153/CIVE 153/ENVE 153](#) Earth Engineering
- [MATH 118](#) Calculus 2 for Engineering

Term 2A (Winter)

- [EARTH 238](#) Introductory Structural Geology
- [GEOE 223/ENVE 223](#) Differential Equations and Balance Laws
- [GEOE 224/ENVE 224](#) Probability and Statistics
- [GEOE 280/ENVE 280](#) Fluid Mechanics

- [GEOE 298](#) Seminar
- Approved elective

Term 2B (Fall)

- [CIVE 204](#) Solid Mechanics 1
- [EARTH 231](#) Mineralogy
- [EARTH 235](#) Stratigraphic Approaches to Understanding Earth's History
- [EARTH 260](#) Introductory Applied Geophysics
- [GEOE 221/CIVE 221](#) Advanced Calculus
- [GEOE 299](#) Seminar
- [WKRPT 200](#) Work-term Report
- Approved elective

Term 3A (Spring)

- [EARTH 232](#) Introductory Petrography
- [EARTH 458](#) Physical Hydrogeology
- [EARTH 458L](#) Field Methods in Hydrogeology
- [GEOE 353/CIVE 353](#) Geotechnical Engineering 1
- [GEOE 392/CIVE 392/ENVE 392](#) Economics and Life Cycle Cost Analysis
- [GEOE 398](#) Seminar
- [WKRPT 300](#) Work-term Report
- Approved elective

Term 3B (Winter)

- [EARTH 333](#) Introductory Sedimentology
- [EARTH 390](#) Methods in Geological Mapping (see Note)
- [EARTH 437](#) Rock Mechanics
- [EARTH 438](#) Engineering Geology
- [ENVE 382](#) Hydrology and Open Channel Flow
- [GEOE 399](#) Seminar
- Approved elective

Note: EARTH 390 is offered after winter term exams are finished in April. It is two weeks long, finishing before the spring term begins. Additional field trip fees will apply.

Term 4A (Fall)

- [GEOE 354/CIVE 354](#) Geotechnical Engineering 2
- [GEOE 400](#) Geological Engineering Design Project 1
- [GEOE 498](#) Seminar
- [WKRPT 400](#) Work-term Report
- Three approved electives

Term 4B (Winter)

- [GEOE 391/ENVE 391](#) Law and Ethics for Environmental and Geological Engineers
- [GEOE 401](#) Geological Engineering Design Project 2
- [GEOE 499](#) Seminar
- [GEOE 554/CIVE 554](#) Geotechnical Engineering 3
- ~~Two approved electives~~ **Two or one* approved electives (*Students who have taken excess elective(s) in previous terms may take one elective in 4B provided they satisfy their program elective requirements)**

4.10 Management Engineering [for approval]

Minor Plan Changes

- a) Add UCR 192E
- b) Add PHYS 112 & 122 to NSE List
- c) Modify 4B elective choice

Background & Rationale:

- a) Adding UCR 192E as an alternative to COMMST192/ENGL 192 to provide students more opportunity for additional instruction learning English if they choose.
- b) Adding PHYS 112 & PHYS 122 to NSE list as they are both anti-requisites of PHYS 125 and have online offerings which provides flexibility for students when scheduling their courses.
- c) Modifying the 4B elective choice and by adding clarity wording to the notes section, will provide student flexibility in the 4B term provided all course requirements are met by the end of the term.

Management Engineering

MARK UP

The Management Engineering Academic Curriculum

The term-by-term academic component of the curriculum is as follows:

Term 1A (Fall)

- [CHE 102](#) Chemistry for Engineers
- [MSCI 100](#) Management Engineering Concepts
- [MATH 115](#) Linear Algebra for Engineering
- [MATH 116](#) Calculus 1 for Engineering
- [MSCI 121](#) Introduction to computer Programming

Term 1B (Winter)

- [COMMST 192/ENGL 192](#) or [UCR 192E](#) Communication in the Engineering Profession
- [GENE 123](#) Electrical Circuits and Instrumentation
- [MSCI 100B](#) Seminar
- [MSCI 131](#) Work Design and Facilities Planning
- [MATH 118](#) Calculus 2 for Engineering
- [PHYS 115](#) Mechanics
- Natural Science Elective (see Note 4)

Term 2A (Fall)

- [MSCI 200A](#) Seminar
- [MSCI 240](#) Algorithms and Data Structures
- [MSCI 251](#) Probability and Statistics 1
- [MSCI 261](#) Engineering Economics: Financial Management for Engineers
- [MSCI 271](#) Advanced Calculus and Numerical Methods

- Natural Science Elective (see Note 4)

Term 2B (Spring)

- [MSCI 200B](#) Seminar
- [MSCI 232](#) Modelling in Operations Research
- [MSCI 245](#) Databases and Software Design
- [MSCI 253](#) Probability and Statistics 2
- [MSCI 263](#) Managerial Economics
- Natural Science Elective (see Note 4)

Term 3A (Winter)

- [MSCI 211](#) Organizational Behaviour
- [MSCI 300A](#) Seminar
- [MSCI 334](#) Operations Planning and Inventory Control
- [MSCI 342](#) Principles of Software Engineering
- [MSCI 391](#) Work-term Report
- [MSCI 431](#) Stochastic Models and Methods
- Elective

Term 3B (Fall)

- [MSCI 300B](#) Seminar
- [MSCI 302](#) Engineering Design Methods
- [MSCI 332](#) Fundamentals of Optimization
- [MSCI 333](#) Simulation Analysis and Design
- [MSCI 343](#) Human-Computer Interaction
- [MSCI 392](#) Work-term Report
- Elective

Term 4A (Spring)

- [MSCI 400A](#) Seminar
- [MSCI 401](#) Management Engineering Design Project 1
- [MSCI 434](#) Supply Chain Management
- [MSCI 436](#) Decision Support Systems
- [MSCI 491](#) Work-term Report
- Two electives

Term 4B (Winter)

- [MSCI 311](#) Organizational Design and Technology
- [MSCI 400B](#) Seminar
- [MSCI 402](#) Management Engineering Design Project 2

- Three or two electives (see Note 6)

Notes

1. [MSCI 401](#) and [MSCI 402](#) may be replaced by [GENE 403](#) and [GENE 404](#).
2. Some of the elective courses have prerequisites that are not met by core courses in Management Engineering; see their course descriptions in the current Calendar before planning elective choices.
3. Course offerings may vary from term to term; check course offerings before planning elective choices.
4. If a student cannot find a natural science elective for this term, they may take another course towards their degree requirements with the permission of their academic advisor. Taking another course does not reduce the requirement of three natural science electives.
5. To accommodate a reduce load MSCI 211, 261 and 263 may be taken out of sequence. Note that MSCI 263 is only available in the spring term.
6. **The 4B term may be reduced to 2.0 units (or 1.5 units when combined with an elective reduced load), provided all program course requirements are met by the end of the term.**

Rules Restricting Choice of the Ten Elective Courses

1. Six of the ten electives must be from the list of approved technical electives (see below). Students can count other Engineering courses towards this requirement subject to associate chair approval.
2. One of the ten electives must be from List A of the [Complementary Studies Course Lists for Engineering](#) (i.e., a course on the impact of technology and/or engineering on society).
3. Three of the ten electives must be from the list of approved natural science electives (see below). Students can count other natural science courses towards this requirement subject to associate chair approval.

Technical Electives

Six courses from the following list:

- [MSCI 433](#) Applications of Management Engineering
- [MSCI 435](#) Advanced Optimization Techniques
- [MSCI 446](#) Introduction to Machine Learning
- [MSCI 452](#) Decision Making Under Uncertainty
- [MSCI 531](#) Stochastic Processes and Decision Making
- [MSCI 541](#) Search Engines
- [MSCI 543](#) Analytics and User Experience
- [MSCI 546](#) Advanced Machine Learning
- [MSCI 551](#) Quality Management and Control
- [MSCI 555](#) Scheduling: Theory and Practice
- [MSCI 598](#) Special Topics in Management Engineering

Natural Science Electives

~~Two~~ **Three** courses from the following list:

- [BIOL 110](#), [BIOL 130](#), [BIOL 150](#), [BIOL 165](#), [BIOL 211](#), [BIOL 220](#), [BIOL 239](#), [BIOL 240](#), [BIOL 273](#)

- CHE 161
- CHEM 262
- EARTH 121, EARTH 122, EARTH 123, EARTH 221
- ENVS 200
- **PHYS 112, PHYS 122**, PHYS 124, PHYS 125, PHYS 175, PHYS 233, PHYS 275
- PSYCH 207, PSYCH 261
- SCI 238, SCI 250

Professional Development Courses

Professional development (PD) courses are required as described in the BASc and BSE Specific Degree Requirements section on **Work Terms**. Management Engineering students are also required to take **PD 11** Processes for Technical Report Writing and **PD 22** Professionalism and Ethics in Engineering Practice. These courses replace two of the PD electives such that for Management Engineering students, **PD 11** and **PD 22** are additional core PD courses, and the number of PD electives required is reduced by two. Management Engineering students are

4.11 Mechanical Engineering Sequence Change [for approval]

Summary:

Minor Plan Modification

Move all 8-stream mechanical engineering students into stream 8X.

Background & Rationale:

Pre-covid student satisfaction surveys show that students are not happy about the lack of technical elective (TE) offerings in 4A and the overload of offerings in 4B. Combining both 4A terms into the fall will allow the TEs to be redistributed between 4A and 4B for a more balanced schedule.

Additionally, mechanical engineering is seeing about one request per week for an 8-month coop term, including both 4 and 8 streams. With planning, 4-stream students will also be able to participate in an 8-month coop.

Study/Work Sequence

Legend for Study/Work Sequence Information Table

| Key | Description |
|---------------------|---|
| S/S | Engineering sequence/stream: 8=Stream 8, 4=Stream 4; 8D, 4D=two academic terms and two work terms back to back; 4F=both streams meet up in the 3B fall term; 8S and 4S=special sequencing of terms; 8X=one extended work term |
| F,W,S | Terms: F=September-December; W=January-April; S=May-August |
| 1,2,3,4 plus A or B | Denotes academic year and term. |
| WT | Denotes scheduled work term. |
| 1 | The streaming for Computer Engineering varies depending on demand. With permission and co-ordination through the Electrical and Computer Engineering Undergraduate Office, it is possible to create eight-month co-operative work terms by rearranging the term sequence. |

Study/Work Sequence Information

| Plan | S/S | F | W | S | F | W | S | F | W | S | F | W | S | F | W |
|---|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Architectural | 4S | 1A | WT | 1B | WT | 2A | WT | 2B | WT | 3A | WT | 3B | 4A | WT | 4B |
| Biomedical, Mechatronics, Mechanical , Software | 8X | 1A | 1B | WT | 2A | WT | 2B | WT | 3A | WT | 3B | WT | WT | 4A | 4B |
| Chemical | 4D | 1A | WT | 1B | WT | 2A | WT | 2B | WT | 3A | 3B | WT | WT | 4A | 4B |
| Chemical | 8D | 1A | 1B | WT | 2A | WT | 2B | WT | 3A | WT | WT | 3B | WT | 4A | 4B |
| Civil, Computer ¹ , Management, Mechanical | 8 | 1A | 1B | WT | 2A | WT | 2B | WT | 3A | WT | 3B | WT | 4A | WT | 4B |
| Computer ¹ , Electrical | 4F | 1A | WT | 1B | WT | 2A | WT | 2B | WT | 3A | 3B | WT | 4A | WT | 4B |
| Environmental, Geological, Mechanical, Mechatronics, Systems Design | 4 | 1A | WT | 1B | WT | 2A | WT | 2B | WT | 3A | WT | 3B | WT | 4A | 4B |
| Nanotechnology | 8S | 1A | 1B | WT | 2A | WT | 2B | WT | WT | 3A | 3B | WT | WT | 4A | 4B |
| Software | 8 | 1A | 1B | WT | 2A | WT | 2B | WT | 3A | WT | 3B | WT | 4A | WT | 4B |

4.12 Mechatronics Engineering [for approval]

Summary:

1. Minor Modifications

a) Rephrasing 4A/4B elective choice

2. Course Changes

a) Creating new courses within the mechatronics curriculum to indicate MTE code and update relevant course prerequisites/anti-requisites.

b) Update course descriptions of MTE 120, MTE 262 & MTE 325.

Background & Rationale:

1a) Rephrasing the number of electives required in 4A/4B, provides student flexibility and choice in allocating their complementary studies electives and technical electives. This flexibility also allows students to go on a reduced load without advisor or E&P intervention.

2a) Faculty of Engineering finance has requested courses taught to only mechatronics students be identified with an MTE course code for financial tracking purposes. This also allows for more department content control in the future. Current courses will have anti-requisites added. (SYDE 182 – MTE 182; SYDE 252 = MTE 252; SYDE 351 – MTE 351; ME 351 = MTE 352; ECE 484 = MTE 484)

2b) Updating course description of three core MTE circuits and system courses to better reflect the current course content.

Mechatronics Engineering

MARK UP

The Mechatronics Engineering Academic Curriculum

The term-by-term academic component of the curriculum is as follows:

Term 1A (Fall)

- CHE 102 Chemistry for Engineers
- MATH 115 Linear Algebra for Engineering
- MATH 116 Calculus 1 for Engineering
- MTE 100 Mechatronics Engineering
- MTE 121 Digital Computation

Term 1B (Spring Stream 4/Winter Stream 8X)

- MATH 118 Calculus 2 For Engineering
- MTE 100B Seminar
- MTE 111 Structure and Properties of Materials
- MTE 119 Statics
- MTE 120 Circuits
- MTE 140 Algorithms and Data Structures

Term 2A (Winter Stream 4/Fall Stream 8X)

- MTE 200A Seminar (3 SEM)
 - MTE 201 Experimental Measurement and Statistical Analysis
 - MTE 202 Ordinary Differential Equations
 - MTE 219 Mechanics of Deformable Solids
 - MTE 262 Introduction to Digital Logic
 - ~~SYDE 182~~ MTE 182 Physics 2: Dynamics
 - Complementary Studies Elective
 - WKRPT 100 (stream 4) Work-term Report
-

Term 2B (Fall Stream 4/Spring Stream 8X)

- MTE 200B Seminar
 - MTE 203 Advanced Calculus
 - MTE 204 Numerical Methods
 - MTE 220 Sensors and Instrumentation
 - MTE 241 Introduction to Computer Structures and Real-Time Systems
 - ~~SYDE 252~~ MTE 252 Linear Systems and Signals
 - WKRPT 100 (stream 8X) or WKRPT 200 (stream 4) Work-term Report
-

Term 3A (Spring Stream 4/Winter Stream 8X)

- MTE 300A Seminar
 - MTE 309 Introduction to Thermodynamics and Heat Transfer
 - MTE 320 Actuators and Power Electronics
 - MTE 321 Design and Dynamics of Machines
 - MTE 325 Microprocessor Systems and Interfacing for Mechatronics Engineering
 - ~~SYDE 351~~ MTE 351 Systems Models 1
 - WKRPT 200 (stream 8X) or WKRPT 300 (stream 4) Work-term Report
-

Term 3B (Winter Stream 4/Fall Stream 8X)

- MTE 300B Seminar
 - ~~ME 351~~ MTE 352 Fluid Mechanics 1
 - MTE 322 Electromechanical Machine Design
 - MTE 360 Automatic Control Systems
 - MTE 380 Mechatronics Engineering Design Workshop
 - MSCI 261 Engineering Economics: Financial Management for Engineers
 - Complementary Studies Elective
 - WKRPT 300 (stream 8X) Work-term Report
-

Term 4A (Fall)

- ~~ECE 484~~ MTE 484 Digital Control Applications
 - MTE 400A Seminar
 - MTE 481 Mechatronics Engineering Design Project
 - ~~Two Technical Electives~~ Three electives
-

Term 4B (Winter)

- MTE 400B Seminar
- MTE 482 Mechatronics Engineering Project
- ~~Complementary Studies Elective~~
- ~~Three Technical Electives~~
- Four electives

Complementary Studies Electives

Four complementary studies electives (CSEs) are to be chosen from the [Complementary Studies Course Lists for Engineering](#). One CSE must be chosen from List A, one from List C, and each of the remaining two from any of Lists A, C, or D.

Ethics Requirement

To meet the Ethics Requirement, students must pass one of PD 22 or PHIL 315. PD 22 fulfils one PD requirement, while PHIL 315 fulfils one List C CSE requirement.

Engineering Graphics and Design Milestone

Mechatronics Engineering students must complete training in Engineering Graphics and Design to achieve the Engineering Graphics and Design (EGAD) milestone. Students achieve sufficient EGAD training by passing MTE 100 or a standalone module available to eligible transfer students.

Technical Electives

The five technical electives (TEs) are to be chosen from the list below. ~~In some cases, it may be necessary to verify that all of the prerequisites have been met. Not that courses are available in only one of the fourth-year terms. It is possible to exchange one of the fourth-year CSEs with a TE and thus have three technical electives in 4A (and two CSEs in 4B) or to have four technical electives in 4B (and two CSEs in 4A)~~

Courses Offered in the 4A (Fall) Term

Choose two:

- ME 362 Fluid Mechanics 2
- ME 436 Welding and Joining Processes
- ME 459 Energy Conversion
- ME 524 Advanced Dynamics and Vibrations or SYDE 553 Advanced Dynamics
- ME 548 Numerical Control of Machine Tools 1
- ME 559 Finite Element Methods
- ME 561 Fluid Power Control Systems
- MTE 420 Power Electronics and Motor Drives or ECE 463 Design & Applications of Power Electronic Converters (offered Spring)
- MTE 421 Linear and Nonlinear Electronics
- MTE 460 Mechatronic System Integration
- MTE 544 Autonomous Mobile Robots
- MTE 545 Introduction to MEMS Fabrication
- SYDE 533 Conflict Resolution
- SYDE 543 Cognitive Ergonomics
- SYDE 556 Simulating Neurobiological Systems
- SYDE 575 Image Processing

- SYDE 584 Physiological Systems and Biomedical Design

Courses Offered in the 4B (Winter) Term

Choose three:

- ECE 327 Digital Hardware Systems
- ECE 358 Computer Networks
- ECE 457B Fundamentals of Computational Intelligence
- ECE 488 Multivariable Control Systems
- ME 452 HVAC Load Analysis and Design Fundamentals
- ME 547 Robotic Manipulators: Kinematics, Dynamics, Control or ECE 486 Robotic Dynamics and Control
- ME 555 Computer-Aided Design
- ME 563 Turbomachines
- ME 564 Aerodynamics
- MTE 460 Mechatronic System Integration
- MTE 546 Multi-sensor Data Fusion
- SYDE 522 Foundations of Artificial Intelligence
- SYDE 542 Interface Design
- SYDE 544 Biomedical Measurement and Signal Processing
- SYDE 548 User Centred Design Methods
- SYDE 572 Introduction to Pattern Recognition

4.13 Nanotechnology Engineering [for approval]

Summary:

1. Minor Modifications

- a) Update Technical Elective lists

2. Major Modifications

- a) ~~Create 4 specializations~~

Secretary Note: Major Modifications for consideration as part of the regular agenda

3. Course Changes

- a) Separate the laboratory of NE281 and create stand-alone laboratory course NE380L
- b) Update prerequisites (NE 481)

Background & Rationale:

1a) Adding courses to the Technical Elective lists to provide students more variety and flexibility.

2a) The inherent nature of the program is seen by the choice of highly focused senior laboratory choices available to students. Adding these specializations will help students who are interested in focusing their studies, be able to better communicate their strengths in a particular area of nanotechnology engineering. For each specialization there are two lists. List A courses capture fundamental electives in that area of expertise, and list B courses provide an opportunity for student to further specialize. Nanotechnology Engineering students are required to choose 8 technical electives, 4 of which must be NE designated courses. In order to satisfy the requirement for a specialization, students will need to complete the designated NE454 and NE455 laboratories, choose 2 courses from List A of a specialization, and choose another 3 courses from either List A or List B. Students active in the program when the new specializations are introduced can declare the specializations.

3a) The formation of the new nanobiotechnology lab, NE 380L, addresses a gap in the nanotechnology engineering program, as this lab falls into the nanobiosystems area of focus, which is the last of the four areas of focus in the NE program to receive its dedicated core laboratory (other focus areas include nanoelectronics, nanomaterials, nanoinstrumentation). Currently, this laboratory activity is associated to the course Biology of nanotechnology engineers (NE 281), offered in the 2B term. By moving this to a later term (3A), and changing the focus from biology to nanobiology, this will balance student workload and will provide students with the training of laboratory skills where nanotechnology principles of design and synthesis of active particles and surfaces are applied to biological problems. The lab content will build upon the nanomaterial synthesis and characterization laboratories and lectures of the previous term. NE 380L will be scheduled for 3.0 hrs every other week. The prerequisite restriction to Nanotechnology Engineering is removed from the lab to provide opportunities for students from outside NE. Capacity restrictions will ensure there is space for all NE students.

Impact:

- The total number of course credits for the program will increase by 0.25; the 2B term will remain at 2.75CR, the 3A term will increase to 3.0CR
- The program workload will not change, but the term workloads will be more balanced: Decrease in 2B workload from 20.25 AUs (25.5 hrs/wk) to 19.5 AUs (24 hrs/wk). Increase in 3A workload from 17.75 AUs (20.5 hrs/wk) to 18.5 AUs (22 hrs/wk)
- The change will not impact instructor schedule

- The change will impact lab schedules with 3A labs scheduled in the mornings, and space is available to accommodate these labs.

3b) Updating prerequisites to be in-line with newly created CHE 560 to be cross-listed with NE 481 for accuracy.

Nanotechnology Engineering

MARK UP

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Technical Electives

The Nanotechnology Engineering plan may be divided broadly into four areas of concentration, identified herein as micro and nano-instrumentation, nano-electronics, nanobiosystems, and nanomaterials. A set of eight technical elective course choices is provided in the curriculum to enable students to focus upon at least two of these areas of concentration. Students may choose up to four courses from outside the Nanotechnology Engineering plan to complement their studies. Approved technical electives are listed below. For a list of courses available in a specific term, consult the nanotechnology engineering undergraduate co-ordinator. The associate director (program) has the right, where the number of students enrolled in a course at the end of the Course Selection Period is 10 or less, to cancel the course.

Note: For **NE 453**, more than one course may be offered simultaneously under this course number.

- **NE 335** Soft Nanomaterials
- **NE 344** Electronic Circuits
- **NE 345** Photonic Materials and Devices
- **NE 353** Nanoprobng and Lithography
- **NE 381** Introduction to Nanoscale Biosystems
- **NE 451** Simulation Methods
- **NE 452** Special Topics in Nanoscale Simulations
- **NE 453** Special Topics in Nanotechnology Engineering
- **NE 459** Nanotechnology Engineering Research Project
- **NE 461** Micro and Nano-instrumentation
- **NE 466** Tactile Sensors and Transducers
- **NE 471** Nano-electronics
- **NE 476** Organic Electronics
- **NE 481** Nanomedicine and Nanobiotechnology
- **NE 486** Biosensors
- **NE 487** Microfluidic and Nanobiotechnological Systems
- **NE 488/CHE 561** Biomaterials and Biomedical Design
- **NE 491** Nanostructured Materials
- **NE 496** Nanomaterials for Electrochemical Energy Systems

Students may choose up to a maximum of four non-NE technical elective courses from the lists below.

List 1 —~~200-level~~

Maximum of one technical elective from the following list.

- **AMATH 456 Calculus of Variations**
- **BIOL 240 Fundamentals of Microbiology**

- CHE 225/CHE 425 Strategies for Process Improvement and Product Development
- CIVE 204 Solid Mechanics 1
- CIVE 230 Engineering and Sustainable Development
- CO 487 Applied Cryptography
- ECE 222 Digital Computers
- ECE 224 Embedded Microprocessor Systems
- ECE 250 Algorithms and Data Structures
- ECE 252 Systems Programming and Concurrency
- ECE 254 Operating Systems and Systems Programming
- ECE 260 Electromechanical Energy Conversion
- ECON 371 Business Finance 1
- KIN 255 Fundamentals of Neuroscience
- KIN 340 Musculoskeletal Injury in sport and Activity
- ME 262 Introduction to Microprocessors and Digital Logic
- MSCI 240 Algorithms and Data Structures
- MSCI 245 Databases and Software Design
- MTE 241 Introduction to Computer Structures and Real-Time Systems
- MTE 262 Introduction to Microprocessors and Digital Logic
- STAT 341 Computational Statistics and Data Analysis
- SYDE 223 Data Structures and Algorithms

List 2 —~~Non-NE~~

- BME 384 Biomedical Transport: Biofluids and Mass Transfer
- BME 386 The Physics of Medical Imaging
- BME 393 Digital Systems
- BME 550 Sports Engineering
- BME 587 Special Topics in Biomedical Signals
- CHE 314 Chemical Reaction Engineering
- CHE 331 Electrochemical Engineering
- CHE 361 Bioprocess Engineering
- CHE 480 Process Analysis and Design
- CHE 514 Fundamentals of Petroleum Production
- CHE 516 Energy Systems Engineering
- CHE 521 Process Optimization
- CHE 543 Polymer Production: Polymer Reaction Engineering
- CHE 562 Advanced Bioprocess Engineering
- CHE 571 Industrial Ecology
- CHE 572 Air Pollution Control
- CHE 574 Industrial Wastewater Pollution Control
- CIVE 310 Introduction to Structural Design
- CIVE 460/ME 574 Engineering Biomechanics
- CIVE 512 Rehabilitation of Structures
- ECE 327 Digital Hardware Systems
- ECE 340 Electronic Circuits 2
- ECE 350 Real-Time Operating Systems
- ECE 356 Database Systems
- ECE 358 Computer Networks
- ECE 360 Power Systems and Smart Grids
- ECE 373 Radio Frequency and Microwave Circuits
- ECE 375 Electromagnetic Fields and Waves
- ECE 406 Algorithm Design and Analysis
- ECE 409 Cryptography and System Security
- ECE 416 Advanced Topics in Networking
- ECE 417 Image Processing
- ECE 423 Embedded Computer Systems
- ECE 432 Radio Frequency Integrated Devices and Circuits
- ECE 444 Integrated Analog Electronics

- [ECE 451 Software Requirements Specification and Analysis](#)
- [ECE 452 Software Design and Architectures](#)
- ECE 457A Co-operative and Adaptive Algorithms
- ECE 457B Fundamentals of Computational Intelligence
- ECE 459 Programming for Performance
- ECE 474 Radio and Wireless Systems
- ECE 477 Photonic Devices and Systems
- ECE 484 Digital Control Applications
- ECE 488 Multivariable Control Systems
- ME 340 Manufacturing Processes
- ME 435 Industrial Metallurgy
- ME 459 Energy Conversion
- ME 526 Fatigue and Fracture Analysis
- ME 531 Physical Metallurgy Applied to Manufacturing
- ME 533 Non-metallic and Composite Materials
- [ME 574 Engineering Biomechanics](#)
- [ME 596 Special topics in Mechanical Engineering \(Topic: Introduction to Fabrication and Characterization of Nanostructures\)](#)
- MSCI 331 Introduction to Optimization
- MSCI 332 Deterministic Optimization Models and Methods
- [MSCI 333 Simulation Analysis and Design](#)
- MSCI 342 Principles of Software Engineering
- MSCI 343 Human-Computer Interaction
- MSCI 431 Stochastic Models and Methods
- MSCI 432 Production and Service Operations Management
- MSCI 435 Advanced Optimization Techniques
- MSCI 446 Introduction to Machine Learning
- MSCI 452 Decision Making Under Uncertainty
- MTE 322 Electromechanical Machine Design
- MTE 325 Microprocessor Systems and Interfacing for Mechatronics Engineering
- MTE 360 Automatic Control Systems
- MTE 420 Power Electronics and Motor Drives
- MTE 544 Autonomous Mobile Robots
- MTE 545 Introduction to MEMS Fabrication
- SE 464 Software Design and Architectures
- SYDE 322 Software Design
- SYDE 334 Applied Statistics
- SYDE 522 Foundations of Artificial Intelligence
- SYDE 531 Design Optimization Under Probabilistic Uncertainty
- SYDE 533 Conflict Resolution
- SYDE 542 Interface Design
- SYDE 543 Cognitive Ergonomics
- [SYDE BME 544 Biomedical Measurement and Signal Processing](#)
- SYDE 548 User Centred Design Methods
- SYDE 552/BIOL 487 Computational Neuroscience
- SYDE 556 Simulating Neurobiological Systems
- SYDE 572 Introduction to Pattern Recognition
- [SYDE 575 Image Processing](#)
- SYDE 584 Physiological Systems and Biomedical Design

[Specializations](#)

[The Faculty of Engineering recognizes four specializations with the Nanotechnology Engineering BAsC degree. Students who satisfy the specialization requirements \(courses and grades\) will have the specialization designation shown on their transcript and diploma. Specializations are intended to recognize success in a concentration of electives within the Nanotechnology Engineering degree](#)

specification, where specializations focus the selection of technical electives and do not require extra courses.

Each specialization requires students to select technical electives with a common theme. Students are responsible for meeting the TE requirements of the Nanotechnology Engineering degree when pursuing a specialization. Students must declare a specialization for it to be recognized as part of their degree and appear on the transcript and diploma. To obtain a specialization, students will need to complete the two required laboratories, 2 courses from List A, and another 3 courses from either List A or List B for that specialization.

The specialization course requirements are provided below.

Nanoelectronics Specialization

The nanoelectronics specialization requires:

2 Laboratories:

NE 454A Nano-electronics Laboratory 1

NE 455A Nano-electronics Laboratory 2

List A Technical Electives:

NE 344 Electronic Circuits

NE 345 Photonic Materials and Devices

NE 471 Nano-electronics

NE 476 Organic Electronics

List B Technical Electives:

NE 459 Nanotechnology Engineering Research Project*

NE 466 Tactile Sensors and Transducers

NE 496 Nanomaterials for Electrochemical Energy Systems

ECE 331 Electronic Devices

ECE 432 Radio Frequency Integrated Devices and Circuits

ECE 444 Integrated Analog Electronics

*With approval from the Associate Director (students)

Nanobiosystems Specialization

The Nanobiosystems Specialization requires:

2 Laboratories:

NE 454C Nanobiosystems Laboratory 1

NE 455C Nanobiosystems Laboratory 2

List A Technical Electives:

NE 335 Soft Nanomaterials

NE 381 Introduction to Nanoscale Biosystems

NE 481 Nanomedicine and Nanobiotechnology

NE 486 Biosensors

List B Technical Electives:

NE 459 Nanotechnology Engineering Research Project*

NE 487 Microfluidic and Nanobiotechnological Systems

NE 488 Biomaterials and Biomedical Design

CHE 562 Advanced Bioprocess Engineering

CHE 565 Synthetic Biology Project Design

CIVE 460/ME 574 Engineering Biomechanics

SYDE 544 Biomedical Measurement and Signal Processing
***With approval from the Associate Director (students)**

Nanofabrication Specialization

The Nanofabrication Specialization requires:

2 Laboratories:

NE 454B Nano-instrumentation Laboratory 1

NE 455B Nano- instrumentation Laboratory 1

List A Technical Electives:

NE 345 Photonic Materials and Devices

NE 353 Nanoprobing and Lithography

NE 461 Micro and Nano-instrumentation

List B Technical Electives:

NE 459 Nanotechnology Engineering Research Project*

MTE 545 Introduction to MEMS fabrication

ME 596 Special topics in mechanical engineering;

Intro. Fabrication and Characterization of Nanostructures

***With approval from the Associate Director (students)**

Nanomaterials Specialization

The Nanomaterials Specialization requires:

2 Laboratories:

NE 454D Nanostructured Materials Laboratory 1

NE455D Nanostructured Materials Laboratory 2

List A Technical Electives:

NE 335 Soft Nanomaterials

NE 353 Nanoprobing and Lithography

NE 491 Nanostructured Materials

NE 496 Nanomaterials for Electrochemical Energy Systems

List B Technical Electives:

NE 459 Nanotechnology Engineering Research Project*

CHE 543 Polymer Production: Polymer Reaction Engineering

ME 435 Industrial Metallurgy

ME 533 Non-metallic and Composite Materials

***With approval from the Associate Director (students)**

16. Systems Design Engineering [for approval]

Summary:

1. Minor Modifications

- a) Move courses to alternate terms
- b) Remove Work Report milestone and add Symposium poster milestone requirement

2. Course Changes

- a) Creating milestone course (SYDE 300)
- b) Revising course descriptions (SYDE 182, SYDE 262, SYDE 544)

Background & Rationale:

1a) Due to a modification of the math curriculum, a recommendation in the previous IQAP visit that is shared by the SYDE program is that the optimization course (SYDE 411 – Optimization and Numerical Methods) be shifted to 3B from 4A so students take this course before their fourth-year design project. To accommodate this change, SYDE 312 will be shifted from 3B to 3A and remove SYDE 311 from the 3A core curriculum as it is no longer needed by the systems design students. To balance the 4A term, modifying SYDE 532 (Intro to Complex Systems) to be listed as both a required course and as a technical elective. Student feedback indicates SYDE 532 enables deeper understanding of systems and brings together many pieces of the curriculum. In addition, this course is popular with students outside of the department.

1b) Removing the technical work-report milestone and adding a work-term communication milestone. The new milestone will require students to take PD 11 for the technical report writing element and complete a symposium work-term poster.

2a) A new course SYDE 300 Work-term Poster Symposium will be created in 3B. Requesting the change to be retroactive to September 2021 to capture all current students.

2b) Revising course descriptions to be more consistent with current offerings and curriculum.

Systems Design Engineering

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The Systems Design Engineering Academic Curriculum

The Systems Design curriculum consists of two course groupings:

1. Compulsory core courses that prepare the student for practice in engineering and comprise 70% to 80% of the course load.
2. Elective courses that comprise 20% to 30% of the course load.
Students who began in an earlier year, should refer to an earlier Calendar. Students should contact the Systems Design Engineering website for more details on the transition.

The term-by-term academic component of the curriculum is as follows:

Term 1A (Fall)

- **SYDE 101** Communications in Systems Design Engineering-Written and Oral
- **SYDE 101L** Communications in Systems Design Engineering-Visualization
- **SYDE 111** Calculus 1

- SYDE 113 Elementary Engineering Mathematics
- SYDE 121 Digital Computation
- SYDE 161 Introduction to Design
- SYDE 181 Physics 1: Statics

Term 1B (Spring)

- SYDE 102 Seminar
- SYDE 112 Calculus 2
- SYDE 114 Matrices and Linear Systems
- SYDE 162 Human Factors in Design
- SYDE 192 Digital Systems
- SYDE 192L Digital Systems Laboratory
- SYDE 223 Data Structures and Algorithms
- One Complementary Studies Elective

Term 2A (Winter)

- SYDE 201 Seminar
- SYDE 182 Physics 2: Dynamics
- SYDE 211 Calculus 3
- SYDE 261 Design, Systems, and Society
- SYDE 263 Engineering Prototyping
- SYDE 283 Physics 3: Electricity, Magnetism and Optics
- SYDE 285 Materials Chemistry

Term 2B (Fall)

- SYDE 202 Seminar
- SYDE 212 Probability and Statistics
- SYDE 252 Linear Systems and Signals
- SYDE 262 Engineering Economics of Design
- SYDE 286 Mechanics of Deformable Solids
- SYDE 292 Circuits, Instrumentation, and Measurements
- SYDE 292L Circuits, Instrumentation, and Measurements Laboratory
- ~~WKRPT 200 Work-term Report~~

Term 3A (Spring)

- SYDE 301 Seminar
- ~~SYDE 311 Advanced Engineering Math 2~~
- **SYDE 312 Applied Linear Algebra**
- SYDE 351 Systems Models 1
- SYDE 361 Systems Design Methods 1: Needs Analysis and Prototyping
- SYDE 381 Thermodynamics
- SYDE 383 Fluid Mechanics
- ~~WKRPT 300 Work-term Report~~

Term 3B (Winter)

- **SYDE 300 Work-Term Poster Symposium**
- SYDE 302 Seminar
- ~~SYDE 312 Applied Linear Algebra~~

- SYDE 352 Introduction to Control Systems
- SYDE 352L Control Systems Laboratory
- SYDE 362 Systems Design Methods 2: Testing, Verification, and Validation
- **SYDE 411 Optimization and Numerical Methods**
- One Technical Elective
- One Complementary Studies Elective

Term 4A (Fall)

- SYDE 401 Seminar
- ~~SYDE 411 Optimization and Numerical Methods~~
- SYDE 461 Systems Design Capstone Project 1
- **SYDE 532 Introduction to Complex Systems**
- Two Technical Electives
- One Technical or Complementary Studies Elective
- ~~WKRPT 400 Work term Report~~

4B (Winter)

- SYDE 402 Seminar
- SYDE 462 Systems Design Capstone Project 2
- Three Technical Electives
- One Complementary Studies Elective

Canadian Engineering Accreditation Board (CEAB) Requirements

Students must pass a minimum of 10 electives. To determine the suitability of elective courses, students should complete the **CEAB planner** located on the Systems Design Engineering website. In addition to meeting CEAB requirements, the student's course selections (as reported in their planner) should be logical and defensible. Two CEAB planners must be completed and submitted to the ~~associate chair for undergraduate studies~~ undergraduate coordinator, one planner for approval purposes in the student's 3A term, and one planner for graduation purposes at the end of the student's 4A term.

Students with combinations of electives that result in a plan that does not meet the CEAB criteria will not be permitted to graduate.

Work-term Communication Requirement

Students must complete PD 11 Process for Technical Report Writing as one of their PD electives and SYDE 300 Work-Term Poster Symposium.

Complementary Studies Electives

In addition to the two courses in the core curriculum (**SYDE 261** and **SYDE 262**), a minimum of three complementary studies elective courses must be chosen. Only courses noted in Lists A, B, C, and D in the **Complementary Studies Course Lists for Engineering** are approved complementary studies elective courses. Students must take at least one course from List C. Students may arrange the sequencing of the complementary studies elective courses to suit their academic plan (and any course prerequisites).

Technical Electives

Students must complete a minimum of six department-approved technical electives (TEs) to meet graduation requirements. Students may arrange the sequencing of the technical elective courses to suit their plan (and any course prerequisites).

The Department of Systems Design Engineering offers a wide variety of technical elective courses in the third and fourth year. Students are encouraged to design their own elective package to develop expertise in their particular interest area (see the Technical Elective Package section below). Approved technical elective courses are available from Systems Design Engineering, from other Engineering departments, and from a wide list of technical courses in the faculties of Science and Mathematics. Only courses from Engineering and Computer Science will contribute towards CEAB hours in the categories of "Engineering Science" and "Engineering Design". Some examples are listed below.

Biomedical Engineering

- **BME 499** Elective Biomedical Research Project
- **BME 544 Biomedical Measurement and Signal Processing**
- **BME 550** Sports Engineering
- **BME 551** Biomechanics of Human Movement
- **BME 581** Ultrasound in Medicine and Biology
- **BME 587** Special Topics in Biomedical Signals
- **BME 588** Special Topics in Biomechanics
- **BME 589** Special Topics in Biomedical Devices

Civil Engineering

- **CIVE 440/PLAN 478** Transit Planning and Operations
- **CIVE 460/ME 574** Engineering Biomechanics

Electrical and Computer Engineering

- **ECE 254** Operating Systems and Systems Programming
- **ECE 356** Database Systems
- **ECE 358** Computer Networks
- **ECE 406** Algorithm Design and Analysis
- **ECE 457B** Fundamentals of Computational Intelligence
- **ECE 459** Programming for Performance
- **ECE 484** Digital Control Applications

Management Sciences

- **MSCI 343** Human-Computer Interaction
- **MSCI 432** Production and Service Operations Management
- **MSCI 446** Introduction to Machine Learning
- **MSCI 555** Scheduling: Theory and Practice

Mechanical Engineering

- **ME 321** Kinematics and Dynamics of Machines
- **ME 574/CIVE 460** Engineering Biomechanics

Mechatronics Engineering

- **MTE 241** Introduction to Computer Structures and Real-Time Systems

- **MTE 325** Microprocessor Systems and Interfacing for Mechatronics Engineering
- **MTE 544** Autonomous Mobile Robots

Systems Design Engineering

- **SYDE 322** Software Design
- **SYDE 334** Applied Statistics
- **SYDE 522** Foundations of Artificial Intelligence
- **SYDE 531** Design Optimization Under Probabilistic Uncertainty
- **SYDE 532** Introduction to Complex Systems
- **SYDE 533** Conflict Resolution
- **SYDE 542** Interface Design
- **SYDE 543** Cognitive Ergonomics
- **SYDE 544** Biomedical Measurement and Signal Processing
- **SYDE 548** User Centred Design Methods
- **SYDE 552/BIOL 487** Computational Neuroscience
- **SYDE 553** Advanced Dynamics
- **SYDE 556** Simulating Neurobiological Systems
- **SYDE 572** Introduction to Pattern Recognition
- **SYDE 575** Image Processing
- **SYDE 584** Physiological Systems and Biomedical Design
- **SYDE 599** Special Topics in Systems Design Engineering

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Appendix C: Faculty of Environment

Senate Undergrad Council
Faculty of Environment
November 21, 2023

For Approvals:

Courses: (attachment 1)

1. New
2. Revised
3. Inactivate

Secretary Note: Major Modifications and Academic Regulations (Items 4, 5, 12, 13, 14, 15, & 16) are for consideration on the regular agenda.

~~New Academic Plans/Programs (major):~~

- ~~4. Planning Honours: Social Planning and Community Development Specialization (attachment 2)~~

~~Academic Plan changes (major):~~

- ~~5. Planning Honours: Environmental Planning and Management Specialization, Land Development Planning Specialization, Urban Design Specialization (attachment 3)~~

Academic Plan changes (minor):

6. Diploma in Environmental Assessment (attachment 4)
7. Environment and Business Honours (attachment 5)
8. Knowledge Integration Honours (attachment 6)
9. Knowledge Integration Honours: Collaborative Design Specialization and Science, Technology, and Society Specialization (attachment 7)
10. Planning Honours (attachment 8)
11. Urban Studies Minor (attachment 9)

~~Academic Plan inactivations (major):~~

- ~~12. Planning Honours: Decision Support and Geographical Information Systems Specialization (attachment 10)~~

~~Academic Regulation revisions:~~

- ~~13. Diploma of Excellence in Geographic Information Systems removal of invalid combination with Planning (attachment 11)~~
- ~~14. Diploma of Sustainability invalid combination with Sustainability and Financial Management (attachment 12)~~
- ~~15. Overview of Co-op plan requirements (attachment 13)~~
- ~~16. Repeated Course text (attachment 14)~~

NEW COURSES (for approval)

Environment, Resources & Sustainability, School of

Effective 01-SEP-2024

ERS 221 (0.50) LEC Oceans Sustainability

Designed to introduce students to a wide range of ocean sustainability issues at a general level, this course starts with the how oceans work - tides, currents, waves, chemistry - and the life forms that live there - fish, seabirds, whales, dolphins, sharks, seals, and so on. We look at the uses of the ocean - shipping, fishing, aquaculture, naval warfare, trade - and the major threats to sustainability such as plastics, piracy, and climate change. And then we examine what is being done about it all through things such as the international Law of the Sea, maritime law, marine spatial planning, marine protected areas, collaborative governance systems, and blue economy strategies.

Requisites :

Anitreq: ERS 275 Topic: The Future of our Oceans

Rationale :

This course has been offered multiple terms (including Fall 2023) with a capacity of up to 36 students, as an ERS 275 topics course. The course received excellent reviews from students and covers an area of inquiry that is not currently available in other offerings. At the end of this course, students will be nicely set up for future courses in ocean conservation and sustainability. Short title: Oceans Sustainability

Geography & Environmental Management

Effective 01-SEP-2024

GEOG 476 (1.00) RDG Independent Studies of Selected Topics

Individual study of specific topics not covered in other courses. Students must not register for this course until a faculty member has agreed to supervise the study and the student has developed a brief outline to be filed with the associate chair, undergraduate studies, Department of Geography and Environmental Management.

Requisites :

Prereq: Level at least 3A; Honours students only

Rationale :

To continue the option to allow a 0.50 and 1.00 weighting, two separate course options will be listed in the calendar: GEOG 475 (current) worth 0.50 units and GEOG 476 (new) worth 1.00 units (see GEOG 475 rationale for further information). Repeats set at maximum of 3. Department Consent required. Course is open to all Honours students, across all faculties. Short title: Independent Studies

Planning - School of

Effective 01-SEP-2024

PLAN 107 (0.50) LEC, TUT How Plans are Made: Processes, Stages, and Strategies

This course will explore how planning translates knowledge into action across a wide range of contexts, scales, time-frames, and sub-fields. Students will learn the stages of plan-making, including the identification of planning problems, articulation of the overall vision, goals and objectives, formulation of scenarios and options, selection of the preferred course of action, and evaluation and monitoring. Students will learn how to identify transferable lessons and precedents from the existing literature. The course will also explore how planners work with the public and elected officials to formulate, communicate, and build support for a proposed course of action.

Requisites : Prereq: Planning students only
Rationale : Course added to reflect the curriculum review outcomes. Short title: Plan Process-Stages-Strategy

Effective 01-SEP-2024

PLAN 133 (0.50) LEC, TUT Planning for Equity, Justice, and the Public Interest

This course explores how the concept of the public interest has historically shaped the development of planning as a profession and how it informs contemporary planning practice. By exploring some of the critiques and failures of planning in the public interest, this course will contextualize equity, diversity, inclusion, and justice within planning practice, as well as human rights. Students will learn the ways in which these principles can inform how planners develop their cultural competence, as they relate to intersectional issues of race, ethnicity, colonialism, gender identity, sexual orientation, and disability.

Requisites : Prereq: Planning students only
Rationale : Course added to reflect the curriculum review outcomes. Short title: Plan: Equity-Justice-Public Interest

Effective 01-SEP-2024

PLAN 202 (0.50) LAB, LEC, TUT Transportation and Housing: A Systems Approach

This course presents cities and regions as systems of systems, with a focus on complexity of land use, transportation, and housing. Students will develop an understanding of how the integration of land use, transportation, and housing contributes to the overall development and function of cities and regions. Students will explore how planning interventions can be used to address urban sprawl, influence citizen mobility, and improve job accessibility while gaining an appreciation of how a systems approach to planning balances issues of equity, affordability, economic development, and the environment. Students will learn to use and interpret simple models of city and regional systems to understand complexity, integration, and the system-wide impact of planning interventions.

Requisites : Prereq: PLAN 100; ENVS 178; Level at least 2A
Rationale : Course added to reflect the curriculum review outcomes. Short title:

Transport & Housing Systems

Effective 01-SEP-2024

PLAN 205 (0.50) LAB, LEC, TUT Spatial and Demographic Analysis in Planning

This course focuses on spatial and demographic foundations and analytic approaches used in planning. Students will learn about basic concepts in demography, drivers of population change, as well as techniques for population forecasting and projections. Students will also develop their understanding of the types of spatial data, the foundations of visualizing spatial data, and basic cartography. The course will provide students with an opportunity to apply their knowledge to the collection and analysis of demographic and spatial data relevant to local planning issues.

Requisites : Prereq: ENVS 178; Level at least 2A
Rationale : Course added to reflect the curriculum review outcomes. Short title:
Spatial & Demographic Analysis

Effective 01-SEP-2024

PLAN 267 (0.50) LAB, LEC, TUT Technology in the City

This course will introduce smart urban technologies in the context of managing urban infrastructures and design. Knowledge of how innovations in technology, design, planning, and policy can greatly improve urban living at both local and global scales. The course will explore the potential of smart urban technologies and systems, such as geographic information systems (GIS), artificial intelligence (AI), blockchain, and the Internet of Things (IoT) in the context of city planning and sustainable communities. Labs will enable students to learn about the technology of sensors, the type of data they produce, and how the data can be collectively used for urban applications, such as transportation, public safety, environmental health, and facilities management.

Requisites : Prereq: Level at least 2A. Antireq: PLAN 474 Topic: Technology and the City
Rationale : Course added to reflect the curriculum review outcomes. Antireq added to identify past offering of this course as a topics course. Short title:
Technology in the City

Effective 01-SEP-2024

PLAN 348 (0.50) LEC, SEM, TUT Planning to Confront Climate Change

This course uses a problem-based approach to advance students' knowledge of climate change with an emphasis on the role of planners and public policy in addressing this crisis through both adaptation and mitigation. Students will hone their understanding of how planners can use climate change science to guide their practice and apply their knowledge to develop climate change policies and plans within multi-scale and intersectoral governance systems. Students will explore how the wicked problem of climate change can be confronted through planning policies and laws, design interventions, nature-based solutions, and community engagement.

Requisites : Prereq: PLAN 341; Level at least 3A; Planning Students only. Antireq: PLAN

Rationale : 419; PLAN 474 Topic: Climate Change & Comm Planning
Course added to reflect the curriculum review outcomes. Concepts in PLAN 348 are taught to Planning students, based on concepts learned through prior Planning core courses. PLAN 419 is open to all UW students (other than Planning) and focuses on broader concepts for non-Planning students.
Short title: Planning & Climate Change

Effective 01-SEP-2024

PLAN 358 (0.50) LEC, SEM, TUT Planning Agricultural Systems

This course will focus on the planning approaches and theory relevant to advance sustainable agriculture in rural and urban areas. Students will learn how agricultural systems function to provide benefits to society and the role of planning in the context of the climate and biodiversity crises. Students will also learn about relevant legislation and governance related to agricultural systems in Canada and other parts of the globe. Students will develop their ability to understand the unique challenges related to agriculture in diverse parts of the globe and identify relevant planning approaches to address these challenges.

Requisites : Prereq: Level at least 3A.
Rationale : Course added to reflect the curriculum review outcomes. Short title: Planning Agricultural Systems

Effective 01-SEP-2024

PLAN 375 (0.50) LAB, LEC, TUT Municipal Finance and Land Economics

This course examines the intersecting elements of municipal finance and land economics in the context of planning. Students will develop an understanding of how municipalities generate and receive revenue, in both Canadian and global contexts. Key issues in municipal finance and budgeting will be discussed such as generating revenues through property taxes, development charges, user fees, and transfers from other orders of government. Students will learn key principles of land economics including land value capture and uplift, real estate market functions, and externalities. Students will explore the distributional impacts of different municipal revenue/spending decisions and the influence of broader changes in the economy.

Requisites : Prereq: PLAN 103; Level at least 3A
Rationale : Course added to reflect the curriculum review outcomes. Short Title: Municipal Finance & Land Econ

Effective 01-SEP-2024

PLAN 380 (0.50) LAB, LEC, TUT Crime and the City

This course explores the role of planning community safety through an examination of the intersection between physical and social environments and crime. Students will explore place-based determinants of deviant and anti-social behaviour, illegal activities including property and violent crimes, and perceptions of personal safety. Students will also explore several strategies employed by planners to improve

community safety including crime mapping and crime prevention through environmental design (CPTED). Students will learn about the benefits and criticisms of these tools, while also enhancing their practical skills in city planning through exercises in crime mapping.

Requisites : Prereq: Level at least 3A
Rationale : Course added to reflect the curriculum review outcomes. Short title: Crime & the City

Effective 01-SEP-2024

PLAN 419 (0.50) LAB, LEC, SEM, TUT Planning Climate Change and Community

This course will focus on strategies that planners use to reduce greenhouse gas emissions, adapt to climate change, and build resilience to current and future climate. Students will learn about key opportunities and challenges associated with the integration of climate change into urban and rural planning. Students will learn about topics such as urban climate vulnerability, low-carbon transport systems, urban green infrastructure, reducing social vulnerability with regenerative design, use of information and communication technology for system efficiency and resilience, and assessment of synergies and trade-offs between mitigation and adaptation. Students will also examine leading policy and design cases from communities across Canada and internationally and build skills in climate change plan development.

Requisites : Prereq: Level at least 3A; Not open to Planning Students. Antireq: PLAN 348; PLAN 474 Topic: Climate Change & Comm Planning
Rationale : Course added to reflect the curriculum review outcomes. Concepts in PLAN 348 are taught to Planning students, based on concepts learned through prior Planning core courses. PLAN 419 is open to all UW students (other than Planning) and focuses on broader concepts for non-Planning students. Short title: Climate Change & Community

Effective 01-SEP-2024

PLAN 441 (0.50) LAB, LEC, SEM, TUT Disabling Environments and Accessibility in Planning

This advanced course enhances students' knowledge on the role of planners and planning in creating supportive and accessible environments for all individuals. Through engagement with critical disability scholarship and theories of person-environment interaction, students will explore planned spaces as disabling/enabling environments for people living with physical, cognitive, and sensory/neuro diversity.

Requisites : Prereq: PLAN 133 or PLAN 233; Level at least 3A; Planning students only
Rationale : Course added to reflect the curriculum review outcomes. Short title: Disabling Env & Accessibility

Effective 01-SEP-2024

PLAN 442 (0.50) LEC, SEM, TUT Indigenous Peoples and Planning

This advanced course uses conceptual readings and contemporary case studies from

Canada and other settler-colonial contexts to critically examine how planning initiatives in both urban and rural contexts relate to the rights and aspirations of Indigenous peoples. Students will also explore the possibilities for planning that is grounded in the knowledge, perspectives, and lived experiences of Indigenous peoples.

Requisites : Prereq: PLAN 133 or PLAN 233; Level at least 3A; Planning students only.

Antireq: PLAN 474 Topic: Indigenous Ppl&Commnty Plann'g

Rationale : Course added to reflect the curriculum review outcomes. Short title:
Indigenous Peoples & Planning

Effective 01-SEP-2024

PLAN 443 (0.50) LEC, SEM, TUT Planning for Ethno-Cultural Diversity and Difference

This advanced course delves into the rich body of planning scholarship on spaces of ethno-cultural diversity and difference. Students will interrogate theories of multiculturalism, interculturalism, social inclusion and integration, and equity in the context of planning scholarship and practice. Students will apply these theories to contemporary planning challenges such as multi-generational housing, places of worship, culture-specific design, and inclusive public engagement. Students will study local planning conflicts to understand the role of built form in creating inclusive communities of difference.

Requisites : Prereq: PLAN 133 or PLAN 233; Level at least 3A; Planning students only.

Antireq: PLAN 474 Topic: Multicultural Communities

Rationale : Course added to reflect the curriculum review outcomes. Short title:
Ethno-Culture Diversity & Diff

Effective 01-SEP-2024

PLAN 445 (0.50) LEC, SEM, TUT Gender and Queer Inclusive Planning

This advanced course addresses the intersection between planning, gender, and sexual orientation. Students will learn about strategies for challenging the patriarchal, cis-gendered, and heteronormative assumptions in planning scholarship and practice. Students will explore how urban form shapes experiences of safety and mobility for women and queer communities as well as their sense of belonging. The course will also address how women and queer communities are engaged in planning processes and the profession itself.

Requisites : Prereq: PLAN 133 or PLAN 233; Level at least 3A; Planning students only

Rationale : Course added to reflect the curriculum review outcomes. Short title:
Gender-Queer Inclusiv Planning

Effective 01-SEP-2024

PLAN 468 (0.50) LAB, LEC, SEM, TUT Introduction to Agent-Based Modelling

This course will focus on agent-based simulation models used to investigate research questions about complex social and ecological systems. Students will learn to identify a research question related to a real-world system and describe the system actors, their environment, and feedbacks between them. Students will also learn to

design, build, and analyze simple simulation models of their systems as exploratory "tools to think with", conduct modelling experiments, and communicate the limits of knowledge gained through modelling. Students will develop/enhance their ability to understand and represent a real-world case study as a system, program, and design and interpret experiments.

Requisites : Prereq: ENVS 278; Level at least 3A. Antireq: PLAN 474 Topic: Intro to agent-based modelling

Rationale : Course added to reflect the curriculum review outcomes. Antireq added to identify past offering of this course as a topics course. Short title: Intro to Agent-Based Modelling

Effective 01-SEP-2024

PLAN 476 (0.50) LEC, SEM, TUT Moving Beyond the Car

This course will focus on walking and cycling and the role that planning plays in enhancing active transportation. Students will learn about how automobile dependence shapes patterns, and experiences of mobility beyond the car. Students will also learn about the social, economic, safety, health, and equity benefits of enhancing active transportation, as well as planning, policy, and political challenges. This course will combine theoretical inquiry and empirical case studies from across North America and beyond. Students will enhance skills in evaluating policies, plans and programs related to active transportation, as well as enhance digital communication skills.

[Note: This course may have additional fees.]

Requisites : Prereq: Level at least 3A

Rationale : Course added to reflect the curriculum review outcomes. Short title: Moving Beyond the Car

COURSE CHANGES (for approval)

Dean of Environment

Current Catalog Information

ENVS 205 (0.50) LEC Sustainability: The Future We Want

This course introduces students to the goals, principles, and practices of sustainability. Sustainability thinking, policies, and programs aim to increase and maintain human well-being by integrating or reconciling current social and economic goals (e.g., economic growth; poverty alleviation; gender inequality) with long-term environmental objectives (e.g., improved environmental quality; climate stability; biodiversity conservation; and managing resources to ensure future access). Case studies are used to illustrate solutions for realizing sustainability, emphasizing efforts underway for reaching the United Nations Sustainable Development Goals (SDGs). The course assesses four intersecting and sometimes competing approaches for realizing sustainability: technological innovation; market-based approaches; state

regulation and investment; and individual and collective ('grassroots') action. Key values underlying sustainability are explored, including notions of the "good life", democracy, social justice, and efficiency.

No Special Consent Required

Requisites :

Prereq: Level at least 2A or Sustainability and Financial Management students. Antireq: ENVS 274 081 S19

Effective 01-SEP-2024

Description Change:

This course introduces students to the goals, principles, and practices of sustainability. Sustainability thinking, policies, and programs aim to increase and maintain human well-being by integrating or reconciling current social and economic goals (e.g., economic growth; poverty alleviation; gender inequality) with long-term environmental objectives (e.g., improved environmental quality; climate stability; biodiversity conservation; and managing resources to ensure future access). Case studies are used to illustrate solutions for realizing sustainability, emphasizing efforts underway for reaching the United Nations Sustainable Development Goals (SDGs). The course assesses four intersecting and sometimes competing approaches for realizing sustainability: technological innovation; market-based approaches; state regulation and investment; and individual and collective ("grassroots") action. Key values underlying sustainability are explored, including notions of the "good life", democracy, social justice, and efficiency.

Requisite Change :

Prereq: Level at least 2A

Rationale :

This course is being removed as a core course for first year students in Sustainability and Financial Management (see attachment 9 of this agenda). The prereq is being revised to reflect this change. Antireq is being removed due to time-lapse. Description change is editorial in nature - adding double quotations for consistency in calendar descriptions ("grassroots").

Current Catalog Information

ENVS 210 (0.50) LEC, SEM Future Studies

Different ways of thinking about the future are considered by looking across genres, disciplines, and modes of expression. The course is structured into two parts: the first concentrates on representations of the future ranging from utopian to dystopian visions including their influence on collective perceptions and policy-making; the second centres on methods relied upon to anticipate the future.

No Special Consent Required

Requisites :

Prereq: Level at least 2A. Antireq: ENVS 274 (003) winter 2022

Effective 01-SEP-2024

Description Change:

In this introduction to futures thinking, students will learn to apply robust methods for understanding emerging shifts impacting our volatile world and explore possible alternative outcomes of those changes. Through the lens of a defined topic area we will apply a holistic approach to gathering relevant information, process that information into plausible future scenarios, and use that new knowledge to develop strategic responses

for building resilience. Students will work individually and in groups using active learning approaches to imagine new possibilities and craft tangible outcomes.

Requisite Change :

Rationale :

After the inaugural offering of this course, the instructor has revised the course description to better align with the learning outcomes. The removal of the prereqs opens this course to all students including those in first year.

Current Catalog Information

ENVS 469 (0.50) LAB, LEC Landscape Ecology, Restoration and Rehabilitation

Survey of the major concepts and theories of landscape ecology. Application of these concepts to case studies in restoration and/or rehabilitation. Interaction with professionals from government, NGOs or private industry on ecological issues will also be part of the course. The course includes a practical component on the planning of ecological restoration or rehabilitation projects. [Note: Field trip fee based on destination; will not exceed \$100+HST. WHMIS may be required pending project lab analysis.]

No Special Consent Required

Requisites :

Prereq: ERS 335; Level at least 4A

Effective 01-SEP-2024

Description Change:

Survey of the major concepts and theories of landscape ecology. Application of these concepts to case studies in restoration and/or rehabilitation. Interaction with professionals from government, NGOs, or private industry on ecological issues will also be part of the course. The course includes a practical component on the planning of ecological restoration or rehabilitation projects. [Note: This course may have additional fees.]

Requisite Change :

Prereq: ERS 335; Level at least 4A; WHMIS

Rationale :

Course note changed to reflect the approved generic message regarding additional course fees. The note regarding WHMIS is being removed and added as a prereq as requested by the Kuali team in preparation for the roll-over to the new calendar system.

Environment, Resources & Sustainability, School of

Current Catalog Information

ERS 283 (1.00) FLD, LEC, OLN Ontario Natural History: Species and Patterns

An introduction to natural history, the art and science of identifying organisms, and observing their behaviour and ecological interactions. The students will reside for approximately nine days in a location in Ontario that has exceptional biodiversity. They will learn about local species (with an emphasis on insects, plants, and terrestrial vertebrates), human history and conservation initiatives. Each student must complete a project on an ecological "pattern" in consultation with the professor. [Note: Field trip fee normally \$350+HST; will not exceed \$440+HST.]

Instructor Consent Required

Requisites :

Prereq: ENVS 200; Level at least 2A

Effective 01-MAY-2024

Description Change:

An introduction to natural history, the art and science of identifying organisms, and observing their behaviour and ecological interactions. The students will reside for approximately nine days in a location in Ontario that has exceptional biodiversity. They will learn about local species (with an emphasis on insects, plants, and terrestrial vertebrates), human history and conservation initiatives. Each student must complete a project on an ecological "pattern" in consultation with the professor. [Note: This course may have additional fees.]

Rationale :

The note regarding fees is being changed to the generic note that has been agreed to by the faculties, effective September 2024. The effective date of May 1, 2024, for this course, has been approved by the Registrar's Office.

Current Catalog Information

(0.00)

Effective 01-SEP-2024

Requisite Change :

Prereq: Level at least 4A; Faculty of Environment students only

New Cross Listing :

GEOG 456

Rationale :

The themes of the course align with both GEOG and SERS program goals (focus on conservation and resource management approaches). Although the GEOG 456 is open to SERS students, having a cross-listed ERS version would remove barriers to SERS student enrollment (e.g., course would be listed under ERS course options in the academic calendar and schedule of classes; students could apply the course towards their SERS program degree requirements). See ERS 456 course in this pdf (pg. 10). Removal of antireq is editorial. Format change only for prerequisite.

Geography & Environmental Management

Current Catalog Information

GEOG 319 (0.50) LAB, LEC, TUT Economic Analyses for Regional Planning

Practical application and critical appraisal of regional analysis techniques used by planners, economic developers and consultants. Problem based approaches to understanding the strength and leverage of business and industrial sectors, projection and forecasting, employment and demographic trends, investment decision-making and cost benefit analysis.

No Special Consent Required

Requisites :

Prereq: ENVS 278

Cross-listed as:

PLAN 320

Effective 01-SEP-2024

Description Change:

This course will focus on the analytical tools and techniques used to inform planning and economic development decisions. Students will build on knowledge from prior courses to think critically about analytical

techniques and identify their pros and cons in understanding the workings of local economies. Students will develop their understanding of employment and demographic forecasting, economic strength analysis, and cost-benefit analysis. Students will enhance their ability to analyze and evaluate local economic and demographic change. Students will also learn specific local economic analysis techniques and understand their role in informing public policy.

Rationale : Course description updated to reflect planning curriculum review outcomes. GEM approves of these changes.

Current Catalog Information

GEOG 349 (0.50) LEC Urban Form and Internal Spatial Structure

An examination of the major factors giving rise to distinctive styles of urban spatial organization. Focus moves from city-wide scale to subareas/sectors - inner city, housing, retailing, etc., with emphasis on understanding and planning for the dynamics of complex environments. Applied issues or problems are dealt with throughout the course.

No Special Consent Required

Requisites : Prereq: One of GEOG 202, GEOG/ERS 203, GEOG 250 or PLAN 100
Cross-listed as: PLAN 349

Effective 01-SEP-2024

Title Change: Urban Form and Spatial Structure

Description Change: This course will focus on the comparative analysis of urban spatial structure and urban form, as well as the administrative and regulatory implications of urbanization around the world. Students will develop knowledge of global urban issues and compare policy responses related to urban economies, transportation and land use planning, housing and community development, sustainable urban environment, urban poverty, peri-urbanization, urban heritage, and conservation planning, etc. Students will assess planning problems and solutions from both industrialized and developing countries.

Requisite Change : Prereq: GEOG 101 or PLAN 100

Rationale : Course description and title updated to better align with the Planning curriculum review outcomes. Geography and Environmental Management approves of these changes. Prereq revised to reflect course changes, knowledge requirement, and time lapse since last offered. Short title: Urban Form & Space Structure

Current Catalog Information

GEOG 368 (0.50) LEC Conservation/Resource Management of the Built Environment

Consideration of the constraints and guidelines that an application of the principles of ecology places on the planning and management of resources within urban spaces and the implications for urban design. The theory and history of this subject will be discussed together with urban ecomanagement, the management of waste, urban open space and parks, rehabilitated sites, and environmentally sensitive areas.

No Special Consent Required

Requisites : Prereq: ENVS 200
Cross-listed as: PLAN 341
Effective 01-SEP-2024
Title Change: Ecology and Conservation for Planning
Description Change: This course provides students with a critical understanding of the relationship between human development and natural environments. Students will develop an understanding of core ecological principles and how these can be taken up in plans and policies to promote nature conservation in urban and rural environments. The course will include examples of how planners mitigate the environmental impacts of development of land, allotment of open space and parks, and conservation of sensitive areas and species in both urban and rural contexts.
Rationale : Course title and description updated to better align with Planning curriculum review outcomes. Geography and Environmental Management approves of these changes. Short title: Ecology & Conservation

Current Catalog Information

GEOG 456 (1.00) FLD, LEC Transforming Canadian Resource Management

This course builds on thematic areas of climate change, resource management, and sustainability. The evolution of Canadian resource management is traced from subsistence, utilitarian, and intrinsic value perspectives. The current state of resource management is critically evaluated, and alternative ways of thinking about conservation programming will be considered. [Note: This course involves a combination of lecture, class discussion and activities, student presentations, and a required multi-day field trip to Ottawa; field trip fee normally \$300+HST; will not exceed \$600+HST. Field trip dates will be determined no later than the end of the first week of lectures.]

No Special Consent Required

Requisites : Prereq: Level at least 4A Faculty of Environment students only. Antireq: GEOG 474 004 W18

Effective 01-SEP-2024

Requisite Change : Prereq: Level at least 4A; Faculty of Environment students only

New Cross Listing : ERS 456

Rationale : The themes of the course align with both GEOG and SERS program goals (focus on conservation and resource management approaches). Although the GEOG 456 is open to SERS students, having a cross-listed ERS version would remove barriers to SERS student enrollment (e.g., course would be listed under ERS course options in the academic calendar and schedule of classes; students could apply the course towards their SERS program degree requirements). See ERS 456 course in this pdf (pg. 10). Removal of antireq is editorial. Format change only for prerequisite.

Current Catalog Information

GEOG 475 (0.50) RDG Independent Study of Selected Topics

Individual study of specific topics not covered in other courses. Students must not

register for this course until a faculty member has agreed to supervise the study and the student has developed a brief outline to be filed with the associate chair, undergraduate studies. [Note: The weight of the course is dependent upon the topic selected.]

Department Consent Required

Requisites :

Prereq: Level at least 3A Honours students only

Effective 01-SEP-2024

Description Change:

Individual study of specific topics not covered in other courses. Students must not register for this course until a faculty member has agreed to supervise the study and the student has developed a brief outline to be filed with the associate chair, undergraduate studies.

Requisite Change :

Prereq: Level at least 3A; Honours students only

Rationale :

With the shift to using the Quali system in the academic calendar, all notes are being reviewed. The note about the course weight being dependent upon the topic selected will be removed as course units can't change. To continue the option to allow a 0.50 and 1.00 weighting, two separate course options will be listed in the calendar: GEOG 475 (current) worth 0.50 units and GEOG 476 (new) worth 1.00 units. Prereq change editorial only.

Knowledge Integration

Current Catalog Information

INTEG 320 (0.50) LEC

The Museum Course: Research and Design

An introduction to the museum, broadly interpreted as the public face of scholarship.

Students work in small groups to research an inter-disciplinary topic of personal interest, in-depth, and design a museum exhibit suitable for a particular audience.

[Note: WHMIS required.]

No Special Consent Required

Requisites :

Prereq: INTEG 230

Effective 01-SEP-2024

Requisite Change :

Prereq: INTEG 121; INTEG 230; WHMIS

Rationale :

Students who have not successfully complete INTEG 121 prior to INTEG 320 are not sufficiently prepared for this course. WHMIS is being added as a pre-req in preparation of the roll-over to Quali.

Planning - School of

Current Catalog Information

PLAN 100 (0.50) LEC, TUT

The Evolution of Planning

Introduction to planning in its historical and contemporary contexts. Discussion of city types and origins. Consideration of local, national, and international design and management of environment and human habitations. Introduction to selected main themes in planning and architecture. [Note: Estimated additional cost to student: \$30.]

No Special Consent Required

Effective 01-SEP-2024

Title Change: Urbanization Today: Introduction to Cities and Regions
Description Change: This course considers the history of urbanization, models of urban and regional development, and ideals of good urban form in Canadian and global contexts. Students will develop a critical perspective on the historical and contemporary relationships between processes of urbanization and broader societal trends and structures. Students will explore how factors such as economic activity and trade, climate change, migration, inequality, and demographic change impact and are, in turn, influenced by urban and regional development. [Note: This course may have additional fees.]
Rationale : Course description updated to better align with the curriculum review outcomes. Short title: Intro to Cities and Regions

Current Catalog Information

PLAN 103 (0.50) LEC, TUT Planning, Administration, and Finance

Important planning and financial instruments, administrative processes and planning practice are reviewed. Planning and Municipal Acts, official plans, plan amendments, zoning bylaws, site plans, easements, consents, variances, assessments, mill rates, capital works, and debentures. Municipal budgets and accounting concepts, and financing are studied.

No Special Consent Required

Requisites : Prereq: Planning students

Effective 01-SEP-2024

Title Change: Planning Governance and Administration
Description Change: This course focuses on how planning is carried out, by whom, and with what impacts for communities. Students will gain an appreciation of the orders of Canadian government and how municipalities function as a "creature of the province" with the legal authority to create official plans, by-laws, plan amendments, site plans, and variances, among other planning tools. Students will be introduced to the legal and fiscal opportunities and constraints faced by municipalities, as well as how these governance systems shape and are shaped by concerns for efficiency, equity, and environmental sustainability.

Requisite Change : Prereq: Planning students only

Rationale : Course description and title updated to better align with the curriculum review outcomes. Short title: Plan Governance & Admin

Current Catalog Information

PLAN 110 (0.50) LEC, STU Visual Approaches to Design and Communication

Practical project-based skill development involving sketching, digital and film photography, and 2-dimensional computer graphics used by planners to conceive, evaluate, and communicate design ideas. [Note: Estimated material cost to student will not exceed \$125+HST.]

No Special Consent Required

Requisites : Prereq: Planning students

Effective 01-SEP-2024

Title Change: Visual Communication and Design for Planners
Description Change: This course explores multiple forms of visual communication and design. Students will be introduced to two and three-dimensional drawings that are relevant for urban planners and designers. Students will gain practical design skills using both hand drawing/sketching and computer software. A key component of this course is student development of a critical understanding of the role of planners as producers and consumers of visual imagery. Students will also learn and experience design as an iterative process. [Note: This course may have additional fees.]
Requisite Change : Prereq: Planning students only
Rationale : Course description and title updated to better align with the curriculum review outcomes. Short title: Visual Comm & Design

Current Catalog Information

PLAN 203 (0.50) LAB, LEC, TUT Transportation Planning and Analysis

This course provides an in-depth exploration of transportation planning. Topics covered will include fundamentals of transportation systems, the historical evolution of transportation planning, modern approaches to urban and regional transportation planning, and relevant transportation planning methods. Applied analysis emphasizing Canadian urban examples will be undertaken.

No Special Consent Required

Requisites : Prereq: PLAN 104, ENVS 178

Effective 01-SEP-2024

Title Change: Transportation Planning and Mobility
Description Change: This course explores transportation planning in the broader context of human mobility, including the history of transportation systems (passenger and freight), transportation planning tools and techniques, transportation demand management, and transportation system sustainability. Students will learn about the factors shaping transportation systems over time, the connections between transportation systems and broader societal trends, and the specific techniques used in transportation planning. Students will develop skills in how to evaluate the utility of different transportation modes, examine system performance from different perspectives, and conduct demand forecasting and analysis. The course helps students deepen their understanding of the complex interplay among land use, transport systems, and equity explored in prior courses.
Requisite Change : Prereq: Level at least 2B
Rationale : Course description and title updated to better align with the curriculum review outcomes. Prereq changed to level instead of specific courses. Short title: Transportation Plan & Mobility

Current Catalog Information

PLAN 210 (0.50) LEC, TUT Community Design Fundamentals for Planners

This course explores the role of design in shaping human settlements. Students will study fundamental concepts related to urban and regional form and structure as well

as the principles of design. The course will examine the impacts of design and place-making on human well-being through problem-based explorations of built form vis-à-vis transit and movement, sustainability and resilience, social institutions (including heritage), physical infrastructure, social justice, and economic development. Students will demonstrate design literacy through the creation of a sketchbook and a portfolio.

No Special Consent Required

Requisites :

Prereq: PLAN 110; Level at least 2A Planning students

Effective 01-SEP-2024

Component Change:

LAB, LEC, TUT

Description Change:

This course explores the public realm and the impacts of design on everyday life. Students will study fundamental concepts related to built form including morphology, spatial function, and placemaking. Students will explore the local environment through its relationships with environment, society, culture, and economy. Students will learn principles of design theory and iterative thinking, and demonstrate design literacy through observation, analysis, and representation of built form using a range of visual techniques. [Note: This course may have additional fees.]

Rationale :

Course description and components updated to better align with the curriculum review outcomes.

Current Catalog Information

PLAN 211 (0.50) STU Design Studio Foundations

A studio-based course that explores, through problem solving, the built form's connections to its physical-natural setting and its socio-cultural and economic contexts. Individual and group projects, and studio critiques and reviews will underscore visual communication skills through qualitative and quantitative visual analyses, design drawings (e.g., site plans, cross sections, elevations, axonometric projections, and perspective drawings), and constructed and computer models. This course normally includes a field component. [Note: Field trip fee will not exceed \$25+HST. Estimated material cost to student will not exceed \$150+HST.]

Instructor Consent Required

Requisites :

Prereq: PLAN 210

Effective 01-SEP-2024

Description Change:

This is a studio-based course through which students will examine contemporary urban design challenges and apply theory and technical knowledge to the development and presentation of design interventions. The course emphasizes the development of qualitative and quantitative visual analysis skills, as well as the expression of design ideas through a range of manual and digital visual communication techniques. Students work in both individual and group settings to perform research and analyze a small-scale study area and, through studio discussions and critiques, develop creative design solutions. [Note: This course may have additional fees.]

Rationale :

Course description updated to better align with the curriculum review outcomes.

Current Catalog Information

PLAN 233 (0.50) LEC, TUT People and Plans

This course examines major social problems and the role of social planning as a contributing and resolving factor. The relationship between physical and social planning will be discussed along with a selection of social planning topics.

No Special Consent Required

Requisites : Prereq: PLAN 100; Level at least 2A

Effective 01-SEP-2024

Title Change: Social Planning and Community Development

Description Change: This course explores the origins and practices of social planning and its relationship to the field of community development. Students will learn how interventions in the built environment and urban policy-making can be used to advance community well-being and human flourishing. Students will focus on the relationship between planning practice and social outcomes, and the importance of considering social objectives alongside the economic and environmental priorities of sustainable development. Students will expand their skills in demographic analysis to assess community needs through mapping community assets, resources, amenities, and services that support the advancement of complete communities.

Requisite Change : Prereq: Level at least 2B

Rationale : Course description and title updated to better align with the curriculum review outcomes. Short title: Social Plan & Community Dev

Current Catalog Information

PLAN 300 (0.50) LEC, TUT Planning Theory

The course will examine key theoretical contributions to planning practice as well as selected theories guiding place and place-making. Issues of professional practice and ethics will also be considered.

No Special Consent Required

Requisites : Prereq: Level at least 2B Planning students

Effective 01-SEP-2024

Component Change: LEC, SEM, TUT

Title Change: Planning Theory and Ethics

Description Change: This course examines different perspectives on the nature of planning expertise, the ethical and moral frameworks through which planners make decisions, and the desired relationship with community members and other governance actors. Students will learn different theories or models of planning practice, including rational-comprehensive planning, advocacy planning, communicative planning, and others. Students will explore how these theories influence decision-making behaviour and outcomes, as well as express different visions of the roles, expertise, and responsibilities of a planning professional. By exploring different planning models and ethical frameworks, students will also develop their capacities for reflective practice.

Requisite Change : Prereq: Level at least 3A; Planning students only
Rationale : Course description and title updated to better align with the curriculum review outcomes. Prereq editorial change only. Short title: Planning Theory & Ethics

Current Catalog Information

PLAN 309 (0.50) STU Site Planning and Design Studio

A design studio that focuses on design planning for individual sites and small scale developments. Projects integrate critical features: terrain, natural and cultural context, microclimate, infrastructure, and adjacent land uses. Studio seminars, consultation and critiques explore theory and practice in observation, awareness, comprehension, and idea development. [Note: Studio fee of \$15+HST may be charged.]

No Special Consent Required

Requisites : Prereq: PLAN 211

Effective 01-SEP-2024

Description Change: This course introduces students to the site planning and design process for individual or small-scale urban sites. Through focused site visits and analysis exercises, students develop skills in common site planning research and design procedures including the inventory and analysis of a site's natural, built, and social conditions; programming and concept development; and the development of technical drawings that are part of the site plan approval process. Lectures and studio discussions and critiques will help students develop a critical understanding of the economic and policy contexts that inform site planning solutions. [Note: This course may have additional fees.]

Rationale : Courses description updated to better align with curriculum review outcomes.

Current Catalog Information

PLAN 320 (0.50) LAB, LEC, TUT Economic Analyses for Regional Planning

Practical application and critical appraisal of regional analysis techniques used by planners, economic developers and consultants. Problem based approaches to understanding the strength and leverage of business and industrial sectors, projection and forecasting, employment and demographic trends, investment decision-making and cost benefit analysis.

No Special Consent Required

Requisites : Prereq: ENVS 278

Cross-listed as: GEOG 319

Effective 01-SEP-2024

Description Change: This course will focus on the analytical tools and techniques used to inform planning and economic development decisions. Students will build on knowledge from prior courses to think critically about analytical techniques and identify their pros and cons in understanding the workings of local economies. Students will develop their understanding of employment and demographic forecasting, economic strength analysis, and cost-benefit

analysis. Students will enhance their ability to analyze and evaluate local economic and demographic change. Students will also learn specific local economic analysis techniques and understand their role in informing public policy.

Rationale :

Course description updated to reflect planning curriculum review outcomes. GEM approves of these changes.

Current Catalog Information

PLAN 333 (0.50) SEM Neighbourhood and Community Planning

This course examines concepts and issues related to social planning for neighbourhood and community environments. It considers planning for particular target populations in the contexts of gentrification, suburbanization and core area revitalization. It will review models of neighbourhood change and community development and will address ways to involve community members in the planning process. This course normally includes a field component. [Note: Field trip fee will not exceed \$45+HST.]

No Special Consent Required

Requisites :

Prereq: PLAN 233

Effective 01-SEP-2024

Description Change:

This course examines various concepts and issues related to community planning at the neighbourhood-scale. Students will learn about the dynamics of neighbourhood change by exploring gentrification, suburbanization, and core area revitalization, and will gain an appreciation of how different community groups organize and respond to these changes. Students will also explore how planning practice can foster community capacity building and empowerment, and support community-led initiatives. This course normally includes a field component. [Note: This course may have additional fees.]

Rationale :

Course description updated to better align with the curriculum review outcomes.

Current Catalog Information

PLAN 341 (0.50) LEC Conservation/Resource Management of the Built Environment

Consideration of the constraints and guidelines that an application of the principles of ecology places on the planning and management of resources within urban spaces and the implications for urban design. The theory and history of this subject will be discussed together with urban ecomanagement, the management of waste, urban open space and parks, rehabilitated sites, and environmentally sensitive areas.

No Special Consent Required

Requisites :

Prereq: ENVS 200

Cross-listed as:

GEOG 368

Effective 01-SEP-2024

Title Change:

Ecology and Conservation for Planning

Description Change:

This course provides students with a critical understanding of the relationship between human development and natural environments. Students will develop an understanding of core ecological principles and how these can be taken up in plans and policies to promote nature conservation in urban and rural environments. The course will include examples of how

planners mitigate the environmental impacts of development of land, allotment of open space and parks, and conservation of sensitive areas and species in both urban and rural contexts.

Rationale : Course title and description updated to better align with Planning curriculum review outcomes. Geography and Environmental Management approves of these changes. Short title: Ecology & Conservation

Current Catalog Information

PLAN 349 (0.50) LEC Urban Form and Internal Spatial Structure

An examination of the major factors giving rise to distinctive styles of urban spatial organization. Focus moves from city-wide scale to subareas/sectors - inner city, housing, retailing, etc., with emphasis on understanding and planning for the dynamics of complex environments. Applied issues or problems are dealt with throughout the course.

No Special Consent Required

Requisites : Prereq: One of GEOG 101, 202/202A, PLAN 100

Cross-listed as: GEOG 349

Effective 01-SEP-2024

Title Change:

Urban Form and Spatial Structure

Description Change:

This course will focus on the comparative analysis of urban spatial structure and urban form, as well as the administrative and regulatory implications of urbanization around the world. Students will develop knowledge of global urban issues and compare policy responses related to urban economies, transportation and land use planning, housing and community development, sustainable urban environment, urban poverty, peri-urbanization, urban heritage, and conservation planning, etc. Students will assess planning problems and solutions from both industrialized and developing countries.

Requisite Change :

Prereq: GEOG 101 or PLAN 100

Rationale :

Course description and title updated to better align with the Planning curriculum review outcomes. Geography and Environmental Management approves of these changes. Prereq revised to reflect course changes, knowledge requirement, and time lapse since last offered. Short title: Urban Form & Space Structure

Current Catalog Information

PLAN 401 (0.50) LEC, STU Planners and Planning Tribunals

An examination of tribunals and boards that adjudicate matters related to land use planning, environmental and heritage protection, property assessment, land valuation, and other matters. Topics include tribunal/board history; appeal rights and procedures; the roles and responsibilities of planners, lawyers, and stakeholders; and critical perspectives regarding current and alternative practices. [Note: Additional cost for document preparation will not exceed \$100+HST.]

No Special Consent Required

Requisites : Prereq: Level at least 4A Planning students

Effective 01-SEP-2024

Component Change: LEC, STU, TUT
Title Change: Conflict, Negotiation, and Tribunals in Planning
Description Change: The course will explore the concept, causes, and roles of conflict, noting potential positive as well as negative characteristics of conflict in planning practice. Various conflict resolution strategies will be examined, including alternative dispute resolution (ADR), negotiation, and mediation. The roles of formal planning tribunals will be discussed through a review of tribunal mandates and practices in Canada and abroad. The course will use simulations to develop students' skills in approaching difficult conversations and active listening. [Note: This course may have additional fees.]

Requisite Change : Prereq: Level at least 4A; Planning students only
Rationale : Course description and title updated to better align with the curriculum review outcomes: Prereq change is editorial. Tutorial added for scheduling flexibility. Short title: Confl, Negotiation & Tribunals

Current Catalog Information

PLAN 405 (0.50) LAB, PRJ Integrated Planning Project

This senior level course provides an opportunity for students to integrate their planning skills and knowledge in an applied context. Working under the supervision of Planning faculty, student groups will tackle case studies based on local real world examples. The projects will require an integrative approach with required design, analytic, and theoretical elements. Students will develop, implement, and present their term projects in a professional setting.

No Special Consent Required

Requisites : Prereq: Level at least 4B Planning students

Effective 01-SEP-2024

Description Change: This capstone course provides students with an opportunity to integrate their planning knowledge and skill in an applied context. Students will apply and integrate methodological, theoretical, analytic, and substantive planning knowledge from previous years in the program to complete a planning project for a professional client. Working in groups, students will develop, implement, and present their applied projects to clients.

Requisite Change : Prereq: Level at least 4B; Planning students only

Rationale : Course description updated to better align with the curriculum review outcomes. Prereq change is editorial.

Current Catalog Information

PLAN 408 (0.50) SEM Urban Design Seminar

An exploration of traditional and contemporary theories of urban design and their application in a variety of contexts. This involves study of approaches that lead to improved quality of life within a robust and sustainable urban environment. Topic includes the spatial, environmental, social, cultural and economic aspects of urban design. Precedents and trends will be analyzed. International viewpoints and case studies are considered. [Note: Estimated material cost will not exceed \$75+HST.]

No Special Consent Required
Requisites : Prereq: Level at least 3A Planning students
Effective 01-SEP-2024
Description Change: This course provides an in-depth exploration of traditional and contemporary theories of urban design and their application in a variety of contexts. Students will develop their understanding of the spatial, environmental, social, cultural, and economic aspects of urban design that lead to improved quality of life within a robust and sustainable urban environment. Students will develop critical thinking skills through analysis of precedents and trends in urban design as well as through study of international case studies and viewpoints. [Note: This course may have additional fees.]
Rationale : Course description updated to better align with curriculum review outcomes.

Current Catalog Information

PLAN 409 (1.00) LEC, STU Urban Design Studio
An intensive urban design studio that addresses both new and redevelopment planning design at a community and higher scale. A problem-based exploration involving studio seminars, consultation and critiques to integrate design elements that provide economically and socially viable communities with a sense of place and community, and improved urban quality. This course normally includes a field component. [Note: Studio fee of \$15+HST may be charged. Field trip fee will not exceed \$50+HST. Estimated additional supply and printing cost will not exceed \$120+HST.]
No Special Consent Required
Requisites : Prereq: PLAN 309 and 313

Effective 01-SEP-2023

Title Change: Community Design Studio
Description Change: This intensive urban design studio provides students with the opportunity to work collaboratively in teams to develop knowledge and experience in planning and urban design at the larger scale of a subdivision or district. Studio and field instruction emphasize the integration of ecological, cultural, economic, and policy factors that contribute to the development or redevelopment of environmentally sustainable and socially vibrant mixed-use communities. Design work and reports will be developed to professional standards for presentation to a community client or expert jury panel. [Note: This course may have additional fees.]
Requisite Change : Prereq: PLAN 309
Rationale : Course title and description updated to better align with the curriculum review outcomes. The prereq has been updated as the revised content taught in PLAN 309 provides relevant knowledge for success in this course. PLAN 313 is being inactivated. Short title: Community Design Studio

Current Catalog Information

PLAN 415 (0.50) LAB, LEC, TUT Urban Planning and Development in Transitional China
This course offers a critical understanding of China's urban planning and development

in the context of the country's economic reform and globalization. It engages with the ongoing social, economic, environmental, and spatial challenges facing transitional urban China. The course exposes students to diverse and essential issues such as urban form, urban system, rural-urban migration, urban land and housing development, economic transformation, spatial restructuring, urban governance, citizenship and rights, urban sprawl and expansion, and environmental sustainability.

No Special Consent Required

Requisites :

Prereq: PLAN 261. Antireq: PLAN 474 001 W17, PLAN 474 001 W19

Effective 01-SEP-2024

Description Change:

This course will focus on contemporary urban planning and development in China, especially in the context of the country's economic reform and globalization. Students will learn about the political, social, economic, environmental, and spatial opportunities and challenges facing urban China in transition, including but not limited to rural-urban migration, urban land and housing development, economic transformation, spatial restructuring, urban governance, citizenship and rights, and environmental sustainability. Students will develop/enhance their understanding of international planning and development, and their critical thinking skills, about diverse urban issues in Chinese cities.

Requisite Change :

Prereq: PLAN 202 or PLAN 261; Level at least 3A

Rationale :

Course description updated to better align with the curriculum review outcomes. Prerequisite updated to include the new course PLAN 202. Antireqs removed due to time-lapse.

Current Catalog Information

PLAN 416 (0.50) LAB, LEC Modelling the City

This course examines the use of computer modeling and simulation in the realm of urban analysis and forecasting, with the goal of understanding urban land-use change trajectories. Topics include an overview of the drivers and consequences in urban land-use change, the role of models, an overview of current methodological approaches, and an examination of urban simulation models as used in the development of urban policies and official plans. This course provides an applied learning environment in which students will gain experience in the use of spatial (GIS) modeling approaches.

No Special Consent Required

Requisites :

Prereq: PLAN/GEOG 281, ENVS 278

Effective 01-SEP-2024

Description Change:

This course will focus on understanding, interpreting, and designing computational models of urban systems. Topics include urban land-use change, transportation, public health, and environmental health. Students will learn how to critically review and interpret urban simulation models and discuss their applications of urban simulation models to planning case studies. Students will also learn how to develop an urban modelling research question, identify needed inputs, and identify output knowledge and how it can be used. Students will develop/enhance their analytical and communication skills.

Requisite Change : Prereq: ENVS 278; PLAN/GEOG 281
Rationale : Course description updated to better align with the curriculum review outcomes. Prereq change is editorial.

Current Catalog Information

PLAN 417 (0.50) LAB, LEC, TUT Aggregate Resources Planning, Development, and Management

This course introduces students to the planning and management of aggregate resources (sand, gravel, and stone). These resources are critical to infrastructure and urban development and are often subject to land use/environmental issues and conflicts. Course topics related to aggregate resources include relevant legislation, geology, economics, site plans, licensing, technical/peer reviews, water resources, pit and quarry rehabilitation and after-use strategies, and significant tribunal decisions. Emphasis will be on practical applications and 'real world' issues.

No Special Consent Required

Requisites : Prereq: Level at least 3A Planning students only. Antireq: PLAN 474 001 F17, PLAN 474 001 F18, PLAN 474 001 F19

Effective 01-SEP-2024

Description Change: This course will focus on the planning and management of aggregate resources (sand, gravel, and stone). These resources are critical to infrastructure and urban development and are often subject to land use/environmental issues and conflicts. Course topics related to aggregate resources include relevant legislation, geology, economics, site plans, licensing, technical/peer reviews, water resources, pit and quarry rehabilitation and after-use strategies, and significant tribunal decisions. Students will enhance their analysis and review experience through study of practical case studies and current issues.

Requisite Change : Prereq: Level at least 3A; Planning students only
Rationale : Course description updated to better align with the curriculum review outcomes. Antireq listing prior topic offerings removed due to time lapsed. Prereq change is editorial.

Current Catalog Information

PLAN 431 (0.50) LEC Issues in Housing

An examination of social planning and policy issues associated with Canada's housing system, considering the roles of various levels of government and the private sector in developing socially sustainable, affordable housing. The course considers the housing needs of various social and demographic groups. We use case study methods to examine redevelopment of social housing. Issues of social mix, live-work, housing need and homelessness, and ways housing can create community are considered. This course normally includes a field component. [Note: Field trip fee will not exceed \$60+HST.]

No Special Consent Required

Requisites : Prereq: Level at least 3A

Effective 01-SEP-2024

Component Change: LEC, TUT

Description Change: This course will focus on issues in housing such as affordability, suitability, need and supply, homelessness, informality, evictions, and displacement. Students will learn about the factors shaping housing provision and outcomes, the current and historic role of the private, public, and not-for-profit sectors in the provision of housing, and the roles of different policies in ameliorating or exacerbating housing concerns. Students will enhance their abilities to identify root causes of planning problems and develop skills to analyze and articulate the implications of different types of housing systems and policies from a diversity of public interest perspectives. [Note: This course may have additional fees.]

Requisite Change : Prereq: Level at least 3A; Planning students only

Rationale : Course description updated to better align with the curriculum review outcomes. Prereq updated to restrict enrollment to Planning students only. TUT added for scheduling flexibility.

Current Catalog Information

PLAN 433 (0.50) SEM Social Concepts in Planning

An advanced examination of planners in their environment considering the relationship between social and land use planning. The course will examine a set of social concepts which may include: safety, gentrification, neighbourhood revitalization, social mix, community, displacement, participation, social capital, social sustainability, accessibility, public space, urban sprawl and social cohesion.

No Special Consent Required

Requisites : Prereq: PLAN 233

Effective 01-SEP-2024

Component Change: LEC, SEM, TUT

Title Change: Social Issues in Planning

Description Change: This course will focus on the key social issues within planning such as inequality, displacement, and discrimination. Students will learn about growing levels of social and spatial inequality within Canadian cities and the role of planning in both exacerbating and reducing these divisions. Students will also learn about the relationship between social planning and land use planning, including how transportation inequalities impact urban and social change. Students will enhance their understanding of how major forces of change, such as deindustrialization and globalization, impact communities in different ways at the neighbourhood, city, and regional scale. [Note: This course may have additional fees.]

Requisite Change : Prereq: PLAN 233; Level at least 3B

Rationale : Course title and description updated to better align with the curriculum review outcomes. Addition of Level at least 3B to prereqs. Addition of components to allow scheduling flexibility. Short title: Social Issues in Planning

Current Catalog Information

PLAN 440 (0.50) LEC Urban Services Planning

This course will explore the interconnections and cascading effects of urban infrastructure services (waste and water systems, power grids, transport networks, digital circuits) and the politics of planning for urban services in global and globalizing cities across the globe. Students will examine, in particular, the impact of climate change, and our collective responses to it, on the delivery of urban services and the role of progressive planning and policy in mediating infrastructure disruptions and disasters.

No Special Consent Required

Requisites :

Prereq: Level at least 3A

Effective 01-SEP-2024

Component Change:

LAB, LEC, SEM, TUT

Title Change:

Urban Services

Description Change:

This course will use a complex systems lens to explore how to plan for and build more resilient and equitable urban service systems. Students will gain an appreciation of how waste, water, sanitation, transportation, energy, and/or telecommunications services are delivered and the implications of infrastructure failures and disruptions. Students will also explore potential solutions for building more resilient and equitable urban services to withstand the inevitable uncertainties of our changing climate. Through various modes of evaluation, students will enhance their oral and written communication skills as well as develop skills in social-ecological-technical systems transformation.

Rationale :

Course description and title updated to better align with the curriculum review outcomes. Components added to provide flexibility in scheduling.
Short title: Urban Services

Current Catalog Information

PLAN 451 (0.50) SEM Tools for Sustainable Communities

This seminar course will focus on conceptual frameworks and tools intended to guide communities to a more sustainable condition. Examples of possible concepts covered in the course are material and energy flows, resilience, adaptability, passive survivability, sufficiency, biophilia, and localization. Course focus will vary from year to year. Recent topics have included The Natural Step, transition towns, LEED-ND, microclimate design, biophilia, and community energy systems.

No Special Consent Required

Requisites :

Prereq: Level at least 3A

Effective 01-SEP-2024

Title Change:

Environmental Planning in Rural and Regional Systems

Description Change:

This course explores environmental planning in rural and regional systems. Students will learn how planning can help address environmental problems (e.g., climate change, biodiversity loss) in distinct rural contexts, how regional approaches to planning help improve capacity to address environmental issues, and how planning tools can be adapted within rural and regional systems. Students will also develop skills in participatory

Rationale : rural appraisal, collaborative planning, and stakeholder analysis.
Course title and description updated to better align with the curriculum review outcomes. Short title: Rural & Regional Env Planning

Current Catalog Information

PLAN 452 (0.50) LEC, TUT Policy Analysis and Program Evaluation

This course considers Policy Analysis and Program Evaluation as step-by-step processes of prescriptive activities used to aid decision-making. For heuristic purposes, simplified models of the policy and program processes are presented so that basic analytical methods for each step in these processes can be explored. The course highlights quick, yet theoretically defensible, methods useful for smaller-scale analyses or for taking a preliminary approach to larger-scale analyses. The instructor will present case materials from planning and policy to illustrate the analytical methods.

No Special Consent Required

Requisites : Prereq: PLAN 350

Effective 01-SEP-2024

Title Change: Policy Analysis and Evaluation for Planners
Description Change: This course reviews the fundamentals of policy analysis, program and plan monitoring, and evaluation in the context of planning practice. Students will learn the principles of structured decision making and multi-criteria analysis as well as the role of various governance actors and other stakeholders in these processes. Through case studies and real-world examples, students will develop an appreciation for the various qualitative and quantitative tools that can be used for policy analysis, and plan and program evaluation.

Requisite Change : Prereq: Level at least 4A; Planning students only

Rationale : Course title and description updated to better align with the curriculum review outcomes. Pre-req revised as PLAN 350 is scheduled to be inactivated at a later date, due to the curriculum review. Short title: Planner Policy Analysis & Eval

Current Catalog Information

PLAN 471 (0.50) LEC Planning Law

An analysis of the legal basis for planning in Ontario and the practice of planning law as it affects planners, municipalities, local councils, property owners and residents. The roles of planning boards, municipal councils, the Ontario Land Tribunal, the Ministry of Municipal Affairs and Housing, provincial Cabinet and the Niagara Escarpment Commission in the planning process will be discussed.

No Special Consent Required

Requisites : Prereq: ENVS 201

Effective 01-SEP-2024

Component Change: LEC, TUT
Title Change: Planning and Municipal Law
Description Change: This course reviews the legal basis for planning in the province of Ontario. Students will examine how legal processes and statutory

requirements, including relevant legislation, by-laws, and policies, guide land use planning. The primary focus will be on the division of authority between provincial and municipal governments, and the role of municipalities in making planning decisions. Students will further explore how planning law differentially affects planners, municipalities, property owners, and residents.

Requisite Change :

Prereq: PLAN 103; ENVS 201; Level at least 4A

Rationale :

Course title and description updated to better align with the curriculum review outcomes. Tutorial added for scheduling flexibility. Short title: Planning & Municipal Law

Current Catalog Information

PLAN 477 (0.50) LEC Freight Planning and Policy

This course critically explores the evolution of freight planning and policy in the urban and regional realms from the early importance of ports to modern global logistics. Emphasis is placed on understanding 1) the theory, fundamental characteristics, and methods of analyzing freight systems, and 2) planning/policy perspectives on freight transportation.

No Special Consent Required

Requisites :

Prereq: Level at least 3A

Effective 01-SEP-2024

Description Change:

This course will focus on material flows from local to global, explored through the transportation land use interrelationships and systems lens. Students will learn the fundamentals of major freight modes, their relevant policy, regulatory and planning domains, and the complex roles, intersections, and impacts of freight in our communities. Students will develop/enhance their research, data analytics, and communication skills.

Rationale :

Course description updated to better align with the curriculum review outcomes.

Current Catalog Information

PLAN 480 (0.50) FLD Theory and Practice of Planning in the U.K.

Familiarization with the contribution of U.K. theory and practice to Canadian planning. Study of development of U.K. planning from mid-eighteenth century to present with reference to new town and urban redevelopment. Additional student costs for travel include flight, food and lodging. For information on duration, itinerary and travel costs contact the instructor.

Department Consent Required

Requisites :

Prereq: Level at least 3A Planning students

Effective 01-SEP-2024

Title Change:

Planning Theory and Practice Abroad

Description Change:

This course will introduce students to international planning theories and practices through an immersive international field trip that entails site visits to and observations of planning interventions, and through meetings with local planning experts (academics and practitioners). Students will develop/enhance their ability to connect theory and practice as well as

various planning aspects. They will also enhance their ability to analyze a case study in-depth. Importantly, the students will forge international connections.

Rationale :

Course title and description updated to better align with the curriculum review outcomes. Short title: Plan Theory & Practice Abroad

Current Catalog Information

PLAN 483 (0.50) LEC Land Development Planning

An examination of planning issues related to the design, economics and financing of private land and building construction projects including residential high-rise condominium, low-rise residential subdivision, infill, intensification and brownfield redevelopment and industrial/commercial land development. The course focuses on developer decision-making, analysis of risk, sources of financing, planning, environmental and engineering aspects of land development. This course may include a field component. [Note: Field trip fee will not exceed \$50+HST]

No Special Consent Required

Requisites :

Prereq: Level at least 3A

Effective 01-SEP-2024

Description Change:

This course provides a planning perspective on the design, economics, and financing of land development projects (e.g., residential high-rise condominium, low-rise residential subdivision, infill, intensification, brownfield redevelopment, and/or industrial/commercial land development). The perspectives and roles of public and private sector planners will be examined in this course. Students will learn about sources of financing, review land use planning principles and policies, and discuss the environmental and engineering aspects of land development. Students will acquire skills in project risk analysis and pro forma calculation. This course may include a field component. [Note: This course may have additional fees.]

Requisite Change :

Prereq: Level at least 3B

Rationale :

Course description updated to better align with the curriculum review outcomes. Level adjusted on the prereq from 3A to 3B.

Current Catalog Information

PLAN 485 (0.50) PRJ Projects, Problems, and Readings in Planning

Special planning projects and problems chosen in consultation with instructor. [Note:

Prior to registering for this course, students must arrange with a faculty member to serve as advisor and complete a contract.]

Instructor Consent Required

Requisites :

Prereq: Level at least 3A Planning students

Effective 01-SEP-2024

Description Change:

This course offers students with an opportunity to explore an interest in a specific area of planning through directed supervision of a Planning faculty member. Course readings and deliverables are negotiated between the instructor and the student to provide appropriate scope and rigour. [Note: Prior to registering for this course, students must arrange with a faculty

Rationale : member to serve as advisor and complete a contract.]
Course description updated to better align with the curriculum review outcomes. Repeat maximum lowered to 3.

Current Catalog Information

PLAN 490 (1.00) ESS Senior Honours Essay
Practical experience in carrying out a research proposal under the direction of a faculty member. The results of this research will be presented in the form of an essay that meets both professional and academic standards.
Department Consent Required
Requisites : Prereq: Level at least 4A Planning students

Effective 01-SEP-2024

Description Change: Students will pursue an independent research project under the direction of a faculty member. The results of this research will be presented in the form of an essay that meets both professional and academic standards.
Rationale : Course description updated to better align with curriculum review outcomes.

Environment, Enterprise & Development - School of

Current Catalog Information

ENBUS 112 (0.50) LEC, TUT Operationalizing Sustainable Development within Business
This course will explore organizational structures within business. Discussions will focus on factors that deter organizational change along with the means of overcoming these issues. A variety of guest speakers will demonstrate how the greening of industry has affected organizational structure in different business sectors. This course includes a review of business case studies where environmental management changes have resulted. [Note: Formerly ENBUS 312]
No Special Consent Required
Requisites : Prereq: ENBUS 102

Effective 01-SEP-2024

Requisite Change :
Rationale : Removal of prerequisite ENBUS 102. The Environment and Business program gains a number of students each year through student transfers. The current prerequisite for ENBUS 112 denies these students an opportunity to take any ENBUS specific courses in their first year 1B semester (the other courses in the first year being ECON, AFM, ENVS courses). Students are often permitted to take ENBUS 112 without completing ENBUS 102 first. These students do not appear to be at a disadvantage compared to those who have completed ENBUS 112.

COURSE INACTIVATIONS (for approval)

Geography & Environmental Management

Effective 01-SEP-2024
GEOG 450 (0.50)
Rationale :

Changing Form and Structure of Metropolitan Canada
This class is redundant based on new elective course offering. Geography and Environmental Management approves of the inactivation of their cross-listed course GEOG 450. These courses will be removed from the Urban Studies Minor; Urban Economic/Finance theme.

Planning - School of

Effective 01-SEP-2024
PLAN 104 (0.50)
Rationale :

Perspectives on Planning
Course content has now been divided between PLAN 100, 107 (new course), and 133 (new course).

Effective 01-SEP-2024
PLAN 105 (0.50)
Rationale :

Introduction to Planning Analysis
Content will be taught in second year (PLAN 205) as a bridge between ENVS 178 and 278.

Effective 01-SEP-2024
PLAN 313 (1.00)
Rationale :

Community Design Studio
This course is now redundant given changes to specialization structure (see attachment 4).

Effective 01-SEP-2024
PLAN 362 (0.50)
Rationale :

Regional Planning and Economic Development
This class is now redundant given new curriculum content. This course will be removed from the Urban Studies Minor/Urban Economics/Finance theme, and the Engineering CSE course list. Engineering has been consulted.

Effective 01-SEP-2024
PLAN 450 (0.50)
Rationale :

Changing Form and Structure of Metropolitan Canada
This class is redundant based on new elective course offering. Geography and Environmental Management approves of the inactivation of their cross-listed course GEOG 450. These courses will be removed from the Urban Studies Minor; Urban Economic/Finance theme.

End of Report

Diploma in Environmental Assessment: Revision

Effective date: September 2024

Rationale: ERS 221 Oceans Sustainability is a proposed new course (see attachment 1)

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

List D - Courses that involve material useful for case application of environmental assessment and related approaches to planning analysis, and problem solving:

- [ENVE 577](#)
- [ENVS 350](#)
- [ENVS 401](#)
- **ERS 221**
- [ERS 317](#)
- [ERS 361/GEOG 361](#)
- [ERS 404/PSCI 432](#)
- [ERS 462/GEOG 462/PSCI 488](#)
- [ERS 484/GEOG 404](#)
- [GEOG 456](#)
- [GEOG 368/PLAN 341](#)
- [GEOG 391](#)
- [GEOG 407](#)
- [GEOG 432/HLTH 420/PLAN 432](#)
- [GEOG 459](#)
- [PLAN 340](#)
- [PLAN 440](#)

Environment and Business Honours: Revision

Effective date: September 2024

Rationale: Both ENBUS 315 and ENBUS 304 were previously delivered as special topics courses under the ENBUS 375 course code. The ENBUS 375 course code is listed as a theme elective. With ENBUS 304 and 315 becoming independent courses with their own course code and description it is necessary to add both courses as theme electives.

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

Two of:

- **ENBUS 304 Circular Economy**
- [ENBUS 308](#) Sustainability Management Standards and Auditing
- [ENBUS 309](#) Applied Social Marketing
- [ENBUS 310](#) Introduction to Sustainable Finance
- [ENBUS 314](#) Sustainable Business Models
- **ENBUS 315 Fashion, Consumption, and Sustainability**
- [ENBUS 375](#) Special Topics in Environment and Business
- [HRM 200](#) Basic Human Resources Management
- [INDEV 308](#) Introduction to Social Entrepreneurship
- [PHIL 215/ARBUS 202](#) Professional and Business Ethics

Knowledge Integration Honours: Revision

Effective date: September 2024

Rationale: Occasionally students transferring into the BKI program complete courses that would be appropriate to be recognized as Breadth Requirements for the BKI but are not yet listed in the calendar. A student successfully petitioned to have SMF 230 and RS 383, and another student successfully petitioned to have PACS 201 be recognized as meeting Breadth Requirements. The petition approvals were based on department approval and confirmation that they would be officially added to the calendar.

| Units delivering Breadth courses | Consultative status |
|----------------------------------|---|
| PACS | Dept. has approved adding PACS 201 to our Breadth Course Requirement list |
| RS | Dept. has approved adding RS 383 to our Breadth Course Requirement list |
| SMF | Dept. has approved adding SMF 230 to our Breadth Course Requirement list |

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

- 0.5 unit Probability and Statistics from:
 - [ARTS 280](#)
 - [ECON 221](#)
 - [ENVS 278](#)
 - [LS 280/SOC 280](#)
 - [PSCI 314](#)
 - [PSYCH 292](#)
 - [SDS 250R/SWREN 250R](#)
 - **SMF 230**
 - [STAT 202, STAT 220](#)
- 0.5 unit Ethics and Social Justice from:
 - [ARBUS 202/PHIL 215](#)
 - [BLKST 201, BLKST 203/ENGL 225](#)
 - [GSI 201, GSI 205, GSI 207, GSI 304](#)
 - [INDEV 300/PHIL 227](#)
 - [LS 352/PHIL 328](#)
 - [PACS 311, PACS 314, PACS 315, PACS 332](#)
 - [PACS 316/PHIL 329](#)
 - [PHIL 221, PHIL 224, PHIL 226, PHIL 228, PHIL 319J, PHIL 320, PHIL 326J, PHIL 420](#)
 - **RS 283, RS 383**
- 0.50 unit Conflict Management from:
 - [COMMST 432](#)

- [LS 271/PACS 202](#), [LS 319/PACS 323](#)
- **PACS 201**, [PACS 313](#), [PACS 327](#)

Knowledge Integration Honours: Collaborative Design Specialization (CDS) and Science, Technology and Society Specialization (STSS): Revision

Effective date: September 2023

Rationale: The following courses are being added due to the outcomes of petitions and departmental review.

- CDS: BET 450, BET 580
- STSS: ERS 361/GEOG 361, ERS 374, PHIL 358, RS 383
- STSS: Any STV labelled course. Knowledge Integration concluded that it would be more efficient to update the calendar to reflect that any STV labelled course would meet the STSS specialization requirements, instead of listing them all independently.

The following courses proposed to be added to the CDS course list are anti-reqs to BET 450: COMMST 227 and MSCI 411

PHIL 245 Critical Thinking About Science, is being inactivated.

(approval of motion needs to be pending approval from BET, ENBUS, ERS, MSCI, PHIL, STV)

| Units delivering courses | Consultative status |
|--------------------------|---|
| BET | Dept. has approved adding BET 450, BET 580 to our CDS list |
| COMMST | Dept. has approved adding COMMST 227 to our CDS list |
| ERS | Dept. has approved adding ERS 374 to our STSS list |
| GEOG | Dept. has approved adding GEOG 361 to our STSS list |
| MSCI | Dept. has approved adding MSCI 411 to our CDS list |
| PHIL | Dept. has approved adding PHIL 358 to our STSS list |
| RS | Dept. approved adding RS 383 to our STSS list |
| STV | Dept. has approved adding the verbiage on our STSS list to reflect any STV course |

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

Collaborative Design Specialization

Successful completion requires:

1. **At least 4.25 units** distributed as follows:
 - Collaborative Design Thinking and Skills:
 - **INTEG 120** The Art and Science of Learning

- [INTEG 121](#) Collaboration, Design Thinking, and Problem Solving
- [INTEG 251](#) Creative Thinking
- One of:
 - [BET 350](#) Customer Experience Design
 - **BET 450 Leadership**
 - **BET 580 Consulting**
 - **COMMST 227 Leadership**
 - [CS 330](#) Management Information Systems
 - [DAC 201/ENGL 203](#) Designing Digital Media
 - [DAC 202/ENGL 204](#) Designing Digital Video
 - [DAC 203/ENGL 304](#) Designing Digital Sound
 - [DAC 204](#) Introduction to Game Design
 - [DAC 300/ENGL 303/COMMST 300](#) Special Topics in Digital Design
 - [DAC 302](#) Digital Storytelling Design
 - [DAC 305](#) Designing and Evaluating Digital Games
 - [DAC 309](#) User Experience Design
 - [ENGL 293](#) Introduction to Digital Media Studies
 - [ENGL 392A](#) Information Design
 - [ENGL 392B](#) Visual Rhetoric
 - [ERS 318](#) Photography for Sustainability
 - [INTEG 375](#) Special Topics in Knowledge Integration
 - [INTEG 410](#) Interdisciplinary Collaboration
 - **MSCI 411 Leadership and Influence**
 - [STV 302](#) Information Technology and Society
 - [SYDE 261](#) Design, Systems, and Society Science, Technology, and Society Specialization

Science, Technology, and Society Specialization

- Three of the following courses, of which two (1.0 unit) must be at the 300- or 400-level. Courses must be chosen from at least two subject codes (i.e., ERS, PLAN, STV, etc.):
 - [ANTH 303](#) Anthropology of Digital Media
 - [ANTH 347](#) Medical Anthropology
 - [ANTH 430/SOC 431](#) Science as Practice and Culture
 - [ARTS 490](#) Fourth-Year Topics in Arts Disciplines (topic: The Socio-Cultural and Political Implications of Artificial Intelligence)
 - [ENGL 108D](#) Digital Lives
 - [ENGL 293](#) Introduction to Digital Media Studies
 - [ENVS 210](#) Future Studies
 - [ENVS 310](#) Future Cities: Integrating Future Thinking into Urban Decisions
 - [ERS 265](#) Water: Environmental History and Change
 - [ERS 316](#) Urban Water and Wastewater Systems: Integrated Planning and Management
 - **ERS 361/GEOG 361 Food Systems and Sustainability**
 - [ERS 372](#) First Nations and the Environment
 - [ERS 404/PSCI 432](#) Global Environmental Governance
 - [ERS 406](#) Paths to Sustainability
 - [ERS 422](#) Biosphere Reserves as Social-Ecological Systems
 - [ERS 454](#) Parks and Protected Areas: Issues and Trends

- [ERS 462/GEOG 462/PSCI 488](#) Global Food and Agricultural Politics
- [GEOG 203](#) Environment and Development in a Global Perspective
- [GEOG 207](#) Climate Change Fundamentals
- [GEOG 306](#) Human Dimensions of Natural Hazards
- [GEOG 307](#) Societal Adaptation to Climate Change
- [GEOG 311](#) Economic Geography and Society
- [GEOG 426](#) Geographies of Development
- [GEOG 432/HLTH 420/PLAN 432](#) Health, Environment, and Planning
- [HIST 212/STV 210](#) The Computing Society
- [HIST 216](#) From Gutenberg to Zuckerberg: A (Long) History of the Internet
- [INDEV 387](#) Global Cities in Global Development
- [LS 413/SOC 413](#) Surveillance and Society
- [PACS 301](#) Special Topics in Peace and Conflict Studies 1
- [PACS 302](#) Special Topics in Peace and Conflict Studies 2
- [PHIL 208](#) Philosophy Through Science Fiction
- [PHIL 224](#) Environmental Ethics
- [PHIL 226](#) Biomedical Ethics
- ~~[PHIL 245](#) Critical Thinking About Science~~
- [PHIL 252/SCI 252](#) Quantum Mechanics for Everyone
- [PHIL 256/PSYCH 256](#) Introduction to Cognitive Science
- [PHIL 259](#) Philosophy of Technology
- [PHIL 271](#) Special Topics
- **PHIL 358 Topics in Philosophy of Science**
- [PHIL 447/PSYCH 447](#) Seminar in Cognitive Science
- [PLAN 333](#) Neighbourhood and Community Planning
- [PLAN 340](#) Canadian Environmental Policy and Politics
- [PLAN 346](#) Advanced Tools for Planning: Public Participation and Mediation
- [PLAN 431](#) Issues in Housing
- [PLAN 433](#) Social Concepts in Planning
- [PLAN 440](#) Urban Services Planning
- **RS 383 Justice, Peace, and Development**
- [SOC 225](#) Games and Gamers
- [SOC 232](#) Technology and Social Change
- [SOC 248](#) Health, Illness, and Society
- [SOC 312](#) Sociology of Science
- **STV courses**
- ~~[STV 100](#) Society, Technology and Values: Introduction~~
- ~~[STV 201](#) Society, Technology and Values: Special Topics~~
- ~~[STV 205](#) Cybernetics and Society~~
- ~~[STV 302](#) Information Technology and Society~~
- ~~[STV 306](#) Biotechnology and Society~~
- ~~[STV 400](#) Society, Technology and Values: Senior Project~~
- ~~[STV 401](#) Society, Technology and Values: Advanced Topics~~

Planning Honours: Revision

Effective date: September 2024

Rationale: In 2010, the School of Planning introduced our current BES (Honours Planning Co-op) program that remains accredited by the Professional Standards Board of the Planning Profession in Canada. Over a decade later, the School is proposing updates to this undergraduate program based on pedagogical and professional rationale.

First, we have made updates based on a thorough *evaluation of our existing program* through: a) consultation (e.g., town halls, surveys, facilitated discussions) with current students, faculty, employers, alumni, and staff; b) curriculum mapping for learning outcomes and professional competency development; and c) comparison with other planning schools in Canada and abroad. We learned that our current program strengths include its breadth, co-operative education component, professionalism of students, affiliation with a Faculty of Environment, and faculty connections to internal (e.g., Heritage Resource Centre, Waterloo Climate Institute) and external (e.g., Canadian Institute of Planners, Ontario Professional Planners Institute, local NGOs) research/practice opportunities. Our analysis indicates that the curriculum is too Canadian- and Ontario-centric; there is some overlap in content throughout the program; the value and appeal of specializations have changed with time; and theory and practice need to be better linked. Our updated program addresses these challenging areas while building on our strengths as a School.

Secondly, our updated program is rooted in *emergent priorities in planning theory and practice*. The Planning profession in Canada has highlighted the centrality of climate change, equity, inclusion and justice, reconciliation with Indigenous Peoples, and adoption of new methods and technologies in contemporary planning practice. The updated program better prepares our students to be the type of planning practitioners who can address these complex issues in the future.

In addition, changes to our current program reflect *faculty expertise* in the School of Planning. We are proud to have new areas of strength in housing, social justice, public participation and community engagement, environmental planning, and professional practice. Our updated program reflects the expertise of our faculty in these areas.

Finally, the updated program considers *institutional changes* within the post-secondary education environment, including at the University of Waterloo. These include operating within new budget models, demographic changes and educational backgrounds of our students, and increasing competition from other Planning programs and schools. The updated program builds on our strengths (e.g., solid generalist curriculum, co-op program, faculty expertise, affiliation with the Faculty of Environment) to ensure we remain a top program for students and employers.

The updated program presented below is based on several years and phases of evaluation and consultation with the School of Planning community. A detailed report of this process and the updated program can be requested for viewing from [Jennifer Dean](#) or [Carrie Mitchell](#).

| Course | Context | Department | Contact |
|--|--|--|--|
| INACTIVATIONS | | | |
| PLAN 362- Regional Planning and Economic Development | <ul style="list-style-type: none"> • Elective in Urban Studies Minor (ENV) • Complementary Studies Course list (ENG) | <ul style="list-style-type: none"> • ENV • ENG | <ul style="list-style-type: none"> • Carol Knipe • Michelle Coulombe |
| PLAN 450- Changing Form and Structure of Metropolitan Canada | <ul style="list-style-type: none"> • Elective in Urban Studies Minor (ENV) | <ul style="list-style-type: none"> • ENV | <ul style="list-style-type: none"> • Johanna Wandel |
| SPECIALIZATION ELECTIVES OUTSIDE OF PLANNING | | | |
| ENVS 401- Cdn Law, Indigenous Peoples and Natural Resources | <ul style="list-style-type: none"> • Added to Environmental Planning | <ul style="list-style-type: none"> • ENV | <ul style="list-style-type: none"> • Johanna Wandel |
| ENVS 444- Ecosystem and Resource Management | <ul style="list-style-type: none"> • Added to Environmental Planning | <ul style="list-style-type: none"> • ENV | <ul style="list-style-type: none"> • Johanna Wandel |
| ENVS 469- Landscape Ecology, Restoration & Rehab | <ul style="list-style-type: none"> • Added to Environmental Planning | <ul style="list-style-type: none"> • ENV | <ul style="list-style-type: none"> • Johanna Wandel |
| ERS 316- Urban Water and Wastewater Systems | <ul style="list-style-type: none"> • Added to Environmental Planning | <ul style="list-style-type: none"> • SERS (ENV) | <ul style="list-style-type: none"> • Christine Barbeau |
| ERS 372: First Nations and the Environment | <ul style="list-style-type: none"> • Added to Environmental Planning | <ul style="list-style-type: none"> • SERS (ENV) | <ul style="list-style-type: none"> • Christine Barbeau |
| SDS 312- Homelessness and Public Policy | <ul style="list-style-type: none"> • Added to Social Planning | <ul style="list-style-type: none"> • SDS (Renison) | <ul style="list-style-type: none"> • Denise Marigold |
| REC 422- Urban Recreation | <ul style="list-style-type: none"> • Added to Social Planning | <ul style="list-style-type: none"> • REC (HLTH) | <ul style="list-style-type: none"> • Karla Boluk |
| TITLES/DESCRIPTION CHANGES FOR CROSS-LISTED COURSES | | | |
| PLAN 432- Health and the Built Environment | <ul style="list-style-type: none"> • GEOG 432 • HLTH 420 | <ul style="list-style-type: none"> • GEM (ENV) • SPHS (HLTH) | <ul style="list-style-type: none"> • Erin O'Connell • Diane Williams |
| PLAN 320- Economic Analysis for Regional Planning | <ul style="list-style-type: none"> • GEOG 319 | <ul style="list-style-type: none"> • GEM (ENV) | <ul style="list-style-type: none"> • Erin O'Connell |
| PLAN 341- Ecology and Conservation for Planning | <ul style="list-style-type: none"> • GEOG 368 | <ul style="list-style-type: none"> • GEM (ENV) | <ul style="list-style-type: none"> • Erin O'Connell |
| PLAN 349- Urban Form and Spatial Structure | <ul style="list-style-type: none"> • GEOG 349 | <ul style="list-style-type: none"> • GEM (ENV) | <ul style="list-style-type: none"> • Erin O'Connell |
| PLAN 414- Heritage Conservation Planning | <ul style="list-style-type: none"> • REC 425 | <ul style="list-style-type: none"> • REC (HLTH) | <ul style="list-style-type: none"> • Karla Boluk |
| PLAN 478- Transit Planning and Operations | <ul style="list-style-type: none"> • CIVE 440 | <ul style="list-style-type: none"> • CIVEE (ENG) | <ul style="list-style-type: none"> • Rania Al-Hammoud /Bruce Hellinga |
| PLAN 484- Physical Infrastructure Planning | <ul style="list-style-type: none"> • CIVE 484 | <ul style="list-style-type: none"> • CIVEE (ENG) | <ul style="list-style-type: none"> • Rania Al-Hammoud |
| OTHER | | | |
| ENVS 278 | Switching terms from Fall (2A) to Winter (2B) | <ul style="list-style-type: none"> • ENV | <ul style="list-style-type: none"> • Johanna Wandel |
| PLAN 450 | Inactivation. Cross-listed with GEOG 450 | <ul style="list-style-type: none"> • GEM (ENV) | <ul style="list-style-type: none"> • Erin O'Connell |

The following courses will be revised/inactivated in the future to allow for students who began the plan in 2023 or before to successfully complete the requirements as per their calendar of entry:

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

Successful completion requires:

1. 20.0 units distributed as follows:

- ~~ENVS 178~~ Environmental Applications of Data Management and Statistics
- ~~ENVS 195~~ Introduction to Environmental Studies
- ~~ENVS 200~~ Field Ecology
- ~~ENVS 201~~ Introduction to Canadian Environmental Law
- ~~ENVS 278~~ Applied Statistics for Environmental Research
- ~~PLAN 100~~ The Evolution of Planning **Urbanization Today: Introduction to Cities and Regions**
- ~~PLAN 102~~ Professional Communication
- ~~PLAN 103~~ Planning, Administration, and Finance **Planning Governance and Administration**
- ~~PLAN 104~~ Perspectives on Planning
- ~~PLAN 105~~ Introduction to Planning Analysis
- ~~PLAN 107~~ **How Plans are Made: Processes, Stages, & Strategies**
- ~~PLAN 110~~ Visual Approaches to Design and Communication **Visual Communication and Design for Planners**
- ~~PLAN 133~~ **Planning for Equity, Justice, and the Public Interest**
- ~~PLAN 202~~ **Transportation and Housing: A Systems Approach**
- ~~PLAN 203~~ Transportation Planning and Analysis
- ~~PLAN 205~~ **Spatial and Demographic Analysis in Planning**
- ~~PLAN 210~~ Community Design Fundamentals
- ~~PLAN 233~~ People and Plans
- ~~PLAN 261~~ Urban and Metropolitan Planning and Development
- ~~PLAN 281~~ Introduction to Geographic Information Systems (GIS)
- ~~PLAN 300~~ **Planning Theory and Ethics**
- ~~One of:~~
 - ~~PLAN 340~~ Canadian Environmental Policy and Politics
 - ~~PLAN 453/GEOG 453~~ Urban Stormwater Management
- ~~PLAN 341~~ **Ecology and Conservation for Planning**
- ~~PLAN 346~~ Advanced Tools for Planning: Public Participation and Mediation
- ~~PLAN 348~~ **Planning to Confront Climate Change**
- ~~PLAN 350~~ Research Methods for Planners
- ~~PLAN 341/GEOG 368~~ Conservation/Resource Management of the Built Environment
- ~~PLAN 375~~ **Municipal Finance and Land Economics**
- ~~PLAN 401~~ Planners and Planning Tribunals **Conflict, Negotiation, and Tribunals in Planning**

- ~~PLAN 403~~ Professional Practice, Public and Private Administration
 - **PLAN 405** Integrated Planning Project
 - **PLAN 452** Policy Analysis & Evaluation **for Planners**
 - **PLAN 471** Planning **and Municipal** Law
 - ~~PLAN 483~~ Land Development Planning
 - **Equity and Justice Breadth Requirement - One of:**
 - **PLAN 441** Disabling Environments and Accessibility in Planning
 - **PLAN 442** Indigenous Peoples and Planning
 - **PLAN 443** Planning for Ethno-cultural Diversity and Difference
 - **PLAN 445** Gender and Queer Inclusive Planning
 - ~~1.0 unit: Elective at the 100-level~~
 - ~~1.5 units: Elective at the 200-level~~
 - ~~4.5 units: Elective at the 300- or 400-level~~
 - **0.5 unit: PLAN course elective at the 200-level**
 - **2.0 units: PLAN course elective at the 300 or 400 level**
 - **1.0 unit: Elective at the 100-level**
 - **1.0 unit: Elective at the 200-level**
 - **3.0 units: Elective at the 300 or 400-level**
2. **Co-operative program requirements.**

Urban Studies Minor – Urban Economics/Finance Theme: Revisions

Effective date: September 2024

Rationale: GEOG 302 (Geographies of Work and Employment) meets the learning outcomes for this theme. Geography and Environmental Management department has approved the addition of this course. PLAN 362 and GEOG 450/PLAN 450 are being inactivated effective September 2024.

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

Theme 1: Urban Economics/Finance

- [ECON 201](#)
- Four of:
 - One of:
 - [AE 392/CIVE 392/ENVE 392/GEOE 392](#)
 - [MSCI 261](#)
 - [ECON 241](#)
 - [ECON 351](#)
 - [ECON 361](#)
 - [ECON 437](#)
 - [ECON 441](#)
 - [ECON 451](#)
 - [ENBUS 204](#)
 - [ENBUS 405](#)
 - [ERS 320](#)
 - **GEOG 302**
 - [GEOG 311](#)
 - [GEOG 319/PLAN 320](#)
 - ~~[GEOG 450/PLAN 450](#)~~
 - [PLAN 103](#)
 - ~~[PLAN 362](#)~~
 - [PLAN 416](#)
 - [PLAN 483](#)

Appendix D: Faculty of Health

FACULTY OF HEALTH – UNDERGRADUATE REPORT (FUGS: May 8, 2023 & FC: April 24, 2023)

to

SENATE UNDERGRADUATE COUNCIL (November 21, 2023)

**Faculty of Health undergraduate curricular changes for
for inclusion in the 2024/2025 Undergraduate Studies Academic Calendar**

1. NEW COURSES – Undergraduate Catalog Report 15 (03-NOV-2023)
HLTH
2. COURSE CHANGES – Undergraduate Catalog Report 15 (03-NOV-2023)
HLTH
KIN
3. ACADEMIC PLANS (MINOR MODIFICATIONS)
 - 3.1. Bachelor of Science, Honours Health Sciences
 - 3.2. Health Informatics Option
 - 3.3. Diploma in Gerontology
 - 3.4. Human Nutrition Minor

Legend

Bold = new text being added

Strikeout = text being removed

Undergraduate report approval process -

Admin Council (AC): April 12, 2023

Faculty Undergraduate Studies Committee (FUGS): May 8, 2023

Faculty Council (FC): April 24, 2023 (approved in advance)

Senate Undergraduate Council (SUC): November 21, 2023

Senate: October 23, 2023

1. NEW COURSES (for approval)

Public Health Sciences - School of

Effective 01-SEP-2024

HLTH 217 (0.50) LEC Biochemistry for Health Sciences

This course will cover several fundamental concepts in biochemistry including structure and function of each of the biochemical molecules: proteins, carbohydrates, lipids, and nucleic acids; metabolic and enzymatic pathways for energy production; regulatory processes; as well as an introduction to the processes of the central dogma. Course content will focus on direct connections to health using clinical examples and applications.

Requisites: Prereq: BIOL 130; CHEM 120 or CHEM 121; Level at least level 2A. Antireq: KIN 217

Rationale: To add a new course. This course, Biochemistry for Health Sciences, will be specifically designed to cover fundamental concepts in molecular biochemistry with direct applications to the clinical context. Further, this course will specifically be for students pursuing the Health Sciences undergraduate degree program. The Health Sciences degree program is inherently designed with an emphasis on courses and content for specialized undergraduate degree training for health-related applications. This biochemistry course will complement the curriculum and further enhance the content by providing detailed information on biomolecular mechanisms, metabolic pathways, enzymatic reactions, and regulatory processes. In addition, the design and delivery of this course will allow for a cohort experience; as well as curriculum building and progression of learning as subsequent courses in the program (e.g., HLTH 341) will directly build upon the content covered in this course. Permission to include BIOL 130 and CHEM 120, 121, as prerequisites have been approved by the Faculty of Science. Since the new HLTH 217 course shares similar content to KIN 217, an antirequisite of KIN 217 has been added. Short course title: Biochemistry for Health

2. COURSE CHANGES (for approval)

Current Catalog Information

HLTH 340 (0.50) LEC Environmental Toxicology and Public Health

An introduction to the basic biological and toxicological processes that determine the effects of environmental pollutants on human health. Emphasis is placed on the mechanisms that give rise to chronic or delayed health effects, such as cancer, genetic mutations, and birth defects.

No Special Consent Required

Requisites: Prereq: BIOL 130, 273, CHEM 120, and one of KIN 217, CHEM 233, 237

Effective 01-SEP-2024

Requisite Change: Prereq: BIOL 273; one of CHEM 233, CHEM 237, HLTH 217, KIN 217

Rationale: To revise the prerequisite. The new HLTH 217, Biochemistry for Health Sciences, course is being added as another prerequisite option for the biochemistry requirement for HLTH 340. The content of HLTH 217 provides excellent preparation in human biochemistry for the course in environmental toxicology and public health. The BIOL 130 and CHEM 120 prerequisites are being removed since they are already prerequisites for BIOL 273 and the biochemistry courses respectively, hence they are redundant.

Current Catalog Information

HLTH 341 (0.50) LEC Principles of Pathobiology

An introduction to the study of biological factors governing disease in humans that will use selected diseases to identify risk factors and illustrate pathogenic mechanisms. The role that behaviour has in modifying biological response to disease may also be considered.

No Special Consent Required

Requisites: Prereq: BIOL 130, 273 and (KIN 217 or CHEM 233 or 237)

Effective 01-SEP-2024

Requisite Change: Prereq: BIOL 273; one of CHEM 233, CHEM 237, HLTH 217, KIN 217

Rationale: To revise the prerequisite. The new HLTH 217, Biochemistry for Health Sciences, course is being added as another prerequisite option for the biochemistry requirement for HLTH 341. The content of HLTH 217 provides excellent preparation in human biochemistry for the course in principles of pathobiology. The BIOL 130 prerequisite is being removed since it is already a prerequisite for BIOL 273, hence it is redundant.

Current Catalog Information

HLTH 451 (0.50) SEM Analysis and Management of Health Information in Aging Populations

The course combines an overview of health policy issues and service delivery with methodological considerations in the analysis of health information from a variety of sources. The topics to be addressed may include the role of health information in evidence-based practice and policy development; basic concepts of demography and health information management; secondary data analysis; case-mix based funding systems; performance indicators, quality, and accountability in health care; clinical applications of health data; need analysis; cost analysis; international comparisons.

No Special Consent Required

Requisites: Prereq: HLTH 335 or STAT 316; Level at least 4A School of Public Health and Health Systems students

Effective 01-SEP-2024

Requisite Change: Prereq: HLTH 335 or STAT 316; Level at least 4A Health Sciences students or Health Studies students or Bachelor of Public Health students or Health Informatics Option students

Rationale: To revise the prerequisite. Adding the "Health Informatics Option students" prerequisite will allow students in the Health Informatics Option who are not School of Public Health Sciences students to enroll in HLTH 451 as long as they meet the HLTH 335, STAT 316 prerequisite.

Current Catalog Information

HLTH 452 (0.50) SEM Decision Making and Decision Support in Health Informatics

One of the major aims of health informatics is to help health professionals make better decisions. To this end, diverse models and methods of decision making and decision support have been developed and implemented in health care settings. This course reviews theories, methods, and technologies for aiding the process of making decisions in health care.

No Special Consent Required

Requisites: Prereq: Level at least 4A School of Public Health Sciences students

Effective 01-SEP-2024

Requisite Change: Prereq: Level at least 4A Health Sciences students or Health Studies students or Bachelor of Public Health students or Health Informatics Option students

Rationale: To revise the prerequisite. Adding the "Health Informatics Option students" prerequisite will allow students in the Health Informatics Option who are not School of Public Health Sciences students to enroll in HLTH 452.

Current Catalog Information

HLTH 455 (0.50) LAB, LEC Disease Mapping and Geographic Information Systems

This course introduces disease mapping. It covers what, why, and how concerning disease mapping with a focus on how. Through hands-on experience with Geographic Information Systems (GIS), students learn how to produce maps for displaying and analyzing geographic patterns of diseases. They also learn how to identify locations of disease clusters and obtain clues as to the disease etiology.

No Special Consent Required

Requisites: Prereq: HLTH 335 or STAT 316; Level at least 4A School of Public Health Sciences students

Effective 01-SEP-2024

Requisite Change: Prereq: HLTH 335 or STAT 316; Level at least 4A Health Sciences students or Health Studies students or Bachelor of Public Health students or Health Informatics Option students

Rationale: To revise the prerequisite. This course on disease mapping and Geographic Information Systems (GIS) has been added to the list of advanced health informatics courses in the Health Informatics Option. Adding the "Health Informatics Option students" prerequisite will allow students in the Health Informatics Option who are not School of Public Health Sciences students to enroll in HLTH 455 as long as they meet the HLTH 335, STAT 316 prerequisite.

Kinesiology and Health Sciences

Current Catalog Information

KIN 217 (0.50) LEC, TST Human Biochemistry

An elementary course in human biochemistry including the metabolism and function of proteins, carbohydrates, lipids, enzymatic function, energy metabolism, and introductory genetics. Emphasis is placed on clinical and medical applications.

No Special Consent Required

Requisites: Prereq: CHEM 120 or 121; Kinesiology, Health Sciences or Honours Science students only

Effective 01-SEP-2024

Requisite Change: Prereq: CHEM 120 or 121; Kinesiology or Honours Science students only. Antireq: HLTH 217

Rationale: To revise the requisites. With the creation of HLTH 217, Health Sciences students will be expected to take HLTH 217. Thus, we can remove Health Sciences students only from the KIN 217 prerequisite list. Since KIN 217 and HLTH 217 share similar content, an antirequisite of the new course, HLTH 217, has been added.

Current Catalog Information

KIN 343 (0.50) LEC Micronutrient Metabolism

This course examines the metabolism of vitamins and minerals in the context of normal human development and aging with an emphasis on disease prevention and understanding the pathogenesis of deficiencies and toxicities. The function and role of vitamins and minerals will be discussed in specific groupings.

No Special Consent Required

Course Attributes: Also offered Online

Requisites: Prereq: KIN 146; One of KIN 217, CHEM 233, CHEM 237

Effective 01-SEP-2024

Requisite Change: Prereq: KIN 146 or BIOL 373; one of CHEM 233, CHEM 237, HLTH 217, KIN 217

Rationale: To revise the prerequisite. The new HLTH 217, Biochemistry for Health Sciences, course is being added as another prerequisite option as School of Public Health Sciences' students take this required course. Department of Kinesiology and Health Sciences' students take KIN 217. The content of HLTH 217 provides excellent preparation in human biochemistry for KIN 343. The School of Public Health Sciences approves the addition of HLTH 217 as a prerequisite. In addition, BIOL 373 is being added as a prerequisite as it provides requisite knowledge found in KIN 146. Thus, by adding BIOL 373, student access to KIN 343 will be enhanced. The Department of Biology was consulted on March 28, 2023, and approves the addition of BIOL 373 to the list of prerequisites for KIN 343.

Current Catalog Information

KIN 346 (0.50) LEC Human Nutrition and Metabolism

This course will examine advanced nutrient metabolism and the interplay between diet, biochemistry, and health and disease outcomes. Challenges in assessing dietary intake and the impact of aging and other behaviours such as exercise on nutritional status will be examined. Approaches used in nutritional research will also be introduced.

No Special Consent Required

Requisites: Prereq: KIN 146; One of KIN 217, CHEM 233, CHEM 237

Effective 01-SEP-2024

Requisite Change: Prereq: KIN 146; one of CHEM 233, CHEM 237, HLTH 217, KIN 217

Rationale: To revise the prerequisite. The new HLTH 217, Biochemistry for Health Sciences, course is being added as another prerequisite option as School of Public Health Sciences' students take this required course. Department of Kinesiology and Health Sciences' students take KIN 217. The content of HLTH 217 provides excellent preparation in human biochemistry for KIN 346. The School of Public Health Sciences approves the addition of HLTH 217 as a prerequisite.

Current Catalog Information

KIN 446 (0.50) LEC Physiological and Biochemical Aspects of Nutrition and Health

Selected examples of nutrient metabolism will be examined in detail in regard to dietary intake, metabolism, and mechanistic effects on human health. Comprehensive coverage of all nutrients is not intended, but rather the examples will be examined in detail with a focus on research techniques and approaches, and various factors that interact with and influence nutrition.

No Special Consent Required

Requisites: Prereq: KIN 146; One of KIN 217, CHEM 233, CHEM 237; Level at least 3A

Effective 01-SEP-2024

Requisite Change: Prereq: KIN 146; one of CHEM 233, CHEM 237, HLTH 217, KIN 217; Level at least 3A

Rationale: To revise the prerequisite. The new HLTH 217, Biochemistry for Health Sciences, course is being added as another prerequisite option as School of Public Health Sciences' students take this required course. Department of Kinesiology and Health Sciences' students take KIN 217. The content of HLTH 217 provides excellent preparation in human biochemistry for KIN 446. The School of Public Health Sciences approves the addition of HLTH 217 as a prerequisite.

End of Report

3. ACADEMIC PLANS (MINOR MODIFICATIONS)

3.1. Bachelor of Science, Honours Health Sciences

Effective September 1, 2024

Background and rationale:

To revise the Health Sciences degree requirements. The KIN 217, Human Biochemistry, course requirement is being replaced with a new HLTH 217, Biochemistry for Health Sciences, course. This new course provides equivalent background in fundamental concepts in molecular biochemistry as KIN 217 but will be specifically for students in the Health Sciences program. Upper year HLTH courses, HLTH 340 and 341, will build on the concepts covered in the new HLTH 217 course.

Calendar Text:

Students may apply for admission directly into the Bachelor of Science, Honours Health Sciences regular or co-operative system of study.

In order to receive the Bachelor of Science, Honours Health Sciences degree, the student must successfully complete 20.0 units of which at least 10.0 total units are at or above the 200-level and including the following requirements:

1. Required Public Health Sciences courses (~~6.75~~ **7.25** units): HLTH 101, HLTH 102, GERON 201/HLTH 201, HLTH 204, HLTH 205, **HLTH 217**, HLTH 230, GERON 245/HLTH 245, GSJ 260/HLTH 260, GERON 310/HLTH 310/KIN 310, HLTH 333, HLTH 341, HLTH 370, GSJ 380/HLTH 380, HLTH 480 (0.25 unit)
2. Required Faculty of Health course (0.5 unit): HEALTH 107
3. Required statistics course (0.5 unit): One of: HLTH 335, STAT 316
4. Methods/application cluster (0.5 unit, see Note 2): One of: HLTH 303, HLTH 344, HLTH 350, HLTH 433, HLTH 435, HLTH 442, HLTH 443, HLTH 451, HLTH 453, HLTH 455, HLTH 458, HLTH 475
5. Core content clusters (1.5 units, see Notes 1, 2):
 - One course in the area of health systems and policy: HLTH 392, HLTH 401, HLTH 403, HLTH 410, HLTH 412
 - One course in the area of social behavioural sciences: GERON 220/HLTH 220, HLTH 301, HLTH 304, GERON 352/HLTH 352/KIN 352/REC 362/SOC 352, HLTH 448, HLTH 449, HLTH 450
 - One course in the area of biohealth: HLTH 290, HLTH 340, HLTH 358, HLTH 421, HLTH 430, HLTH 458, HLTH 461, HLTH 465, HLTH 471
6. Required courses from other departments (~~4.75~~ **4.25** units):
 - BIOL 130 and BIOL 130L, BIOL 239, BIOL 273, BIOL 373
 - CHEM 120 and CHEM 120L, CHEM 123 and CHEM 123L
 - ~~KIN 217~~
 - PSYCH 101/PSYCH 101R
7. Free elective courses: 5.5 units
8. Minimum cumulative major average of 67%; minimum cumulative overall average of 63%.

Notes

1. Certain topics courses (e.g., HLTH 373, HLTH 473) or independent studies (HLTH 472) may be substituted for the core content cluster requirements at the discretion of the School of Public Health Sciences associate director, undergraduate studies.
2. One course may not fulfil more than one requirement in the academic plan:
 - o HLTH 458 cannot be used for both the methods/application cluster and the biohealth core content cluster.

3.2. Health Informatics Option

Effective September 1, 2024

Background and rationale:

To revise the Health Informatics Option requirements. According to the criteria of the [Plan definitions and guidelines](#), options must be available to all students within a faculty. Thus, the Health Informatics Option is being revised to allow all students in the Faculty of Health to enroll. HLTH 230, Introduction to Health Informatics, is being added as a required course in order to provide foundational knowledge in health informatics and to better prepare students for the advanced health informatics courses. A minimum cumulative average requirement of 67% is being added to ensure success in the advanced health informatics courses. A statistical analytics course is being added to provide sufficient skills in statistical coding and analysis of health data as required in the field of health informatics. The socioeconomic aspects of health information requirement is being removed since HLTH 230 provides sufficient background in societal and ethical aspects of technology. The advanced health informatics course requirement is being revised to require that at least one of the two courses is a course from the School of Public Health Sciences (i.e., a HLTH course) so that all students will have a capstone seminar course delivered by an instructor with expertise in health informatics. HLTH 455, Disease Mapping and Geographic Information Systems, course covers analysis of health data from geographical information and is an appropriate course to add to the list of options for the advanced health informatics courses. HLTH 473, Contemporary Issues in Health 4, special topics course and the note that refers to it are being removed in order to make it clear which courses can be used for the option, as only specific courses in the academic calendar should be included, not special topics courses that change from term to term. Permission to include STAT 316 has been approved by the Department of Statistics and Actuarial Science.

Calendar Text:

The Health Informatics Option is designed for ~~School of Public Health Sciences~~ **Faculty of Health** students who are interested in the application of information technology to all aspects of applied health research and practice, including clinical practice, health promotion and disease prevention, delivery of health services, and health policy development.

~~Normally, students who intend to have the Health Informatics Option recognized on their transcript and degree must communicate that intention to the School of Public Health Sciences associate director, undergraduate studies, prior to the start of Year Three by completing a Plan Modification Form.~~

Requirements

In order to graduate with this Option, the following requirements must be met:

1. ~~A minimum minor average of 67% will be required for courses presented for the Option. Successful completion of 20.0 units, including the requirements for the Bachelor of Science, Honours Health Sciences degree or the Bachelor of Public Health, Honours degree.~~
 2. Declare this Option before the beginning of 3B academic term.
 3. Students are required to complete ~~3-5~~ **4.0** units from the following health informatics clusters:
 - **Introduction to health informatics (0.5 unit): HLTH 230**
 - Fundamental computer science (2.0 units):
 - One of: CS 115, CS 135
 - One of: CS 116, CS 136
 - One of: CS 230, CS 234
 - CS 338
 - **Statistical analytics course (0.5 unit):**
 - **One of: HLTH 335, STAT 316**
 - ~~Socioeconomic aspects of health information (0.5 unit):~~
 - ~~One of: STV 100, STV 202, STV 205, STV 302~~
 - Advanced health informatics (1.0 unit):
 - **Two courses, of which at least one must be HLTH:** CS 330, CS 370, CS 436, HLTH 451, HLTH 452, HLTH 453, HLTH 454, **HLTH 455**, HLTH 473 (see Note), MSCI 343
- ~~3. The cumulative averages required are the same as for the Bachelor of Science, Honours Health Sciences. Refer to the Academic Standing page.~~

Note

~~HLTH 473 must be a Health Informatics topic and approved in advance by the associate director, undergraduate studies.~~

3.3. Diploma in Gerontology

Effective September 1, 2024

Background and rationale:

To revise the Diploma in Gerontology requirements. The restricted elective courses are being revised to add HLTH 427, Dementia Care, and HLTH 430, Geriatric Medicine and Health Care, as these are gerontology-focused courses and will provide more elective course options for students pursuing the Diploma in Gerontology.

Calendar Text:

Students registered in degree programs or any non- or post-degree academic plan may pursue the Diploma in Gerontology offered by the School of Public Health Sciences.

The Diploma may be of particular interest to students who would like to understand issues faced by older adults, strategies to promote successful aging, or individuals who are interested in working with older adults. Students with a university degree will be admitted and registered as post-degree students. Students without a university degree who satisfy the admissions requirements described below will be admitted as non-degree students.

Admission Requirements for Non-degree Students

The following are considered minimum admission requirements for students without a university degree or who are not currently in an undergraduate degree program. Students will be considered on an individual basis to determine admissibility to the plan.

1. Completion of a minimum of two years (four terms, total of 10.0 units) or equivalent of post-secondary study prior to beginning the diploma program.
2. BIOL 130, HLTH 103, or their equivalents, within the past five years.

Diploma Requirements

1. A minimum cumulative diploma average of 67% in the course requirements.
2. Successful completion of 3.5 units from the following requirements:
 - Required courses (1.0 unit)
 - GERON 201/HLTH 201
 - GERON 400/HLTH 400
 - Restricted elective courses (2.5 units):
 - GERON 218/HLTH 218/PSYCH 218, GERON 220/HLTH 220, GERON 245/HLTH 245, GERON 310/HLTH 310/KIN 310, GERON 352/HLTH 352/KIN 352/REC 362/SOC 352, BIOL 355/GERON 355, GERON 401A and GERON 401B
 - HLTH 253/SOC 253, HLTH 380, HLTH 420/GEOG 432/PLAN 432, **HLTH 427**, **HLTH 430**, HLTH 451
 - KIN 342, KIN 343, KIN 359, KIN 406, KIN 407, KIN 418, KIN 422, KIN 429
 - PHIL 226, PHIL 319J, PHIL 321J
 - PSYCH 398
 - REC 361
 - RS 266, RS 387
 - SDS 367R
 - SOC 248
 - SOCWK 240R
 - A statistics course (0.5 unit) from: HLTH 204, ARTS 280, KIN 232, PSYCH 292, REC 371, SDS 250R/SWREN 250R, LS 280/SOC 280, STAT 202, STAT 221, STAT 231

Notes

1. A maximum of five years to successfully complete the program from the time the student first enters the program.
2. Students are encouraged to make note of course prerequisites and antirequisites and discuss their Diploma plan and course progression with an academic advisor in the School of Public Health Sciences.
3. Certain topics courses or independent studies on the topic of aging may be substituted for the restricted elective requirements at the discretion of the School of Public Health Sciences associate director, undergraduate studies.

3.4. Human Nutrition Minor

Effective September 1, 2024

Background and rationale:

To revise the Human Nutrition Minor requirements. The new HLTH 217, Biochemistry for Health Sciences, course is being added as another option as School of Public Health Sciences' students take this required course.

Calendar text:

Human Nutrition Minor examines the effects of diet and food on health and disease in human individuals and at the population level. Fundamental and applied knowledge in human nutrition is deemed crucial for a variety of health professions. The study of nutrition includes investigations of cellular metabolism and physiological responses to nutrients, the impact of diet on chronic disease risk, and examinations of food choices in populations.

Students enrolled in any degree program may pursue a minor designation in Human Nutrition.

Requirements

Successful completion of 5.0 units with a minimum cumulative minor average of 60%, from the requirements listed:

- Required courses (2.0 units):
 - BIOL 373
 - KIN 146
 - One of **HLTH 217**, KIN 217, CHEM 233, CHEM 237
 - KIN 343 or KIN 346 (see Note 3)
- Elective courses (3.0 units): BIOL 241, BIOL 345, HLTH 340, HLTH 355, HLTH 421, HLTH 449, HLTH 471, KIN 307, KIN 342, KIN 404, KIN 429, KIN 431, KIN 446; one of KIN 433, KIN 472, HLTH 472; KIN 343 or KIN 346; KIN 432 or HLTH 432B

Notes

1. Courses obtained on a Letter of Permission or in transfer credit must be equivalent to courses listed in the course requirements.
2. KIN 431, KIN 432, KIN 433, KIN 472, HLTH 432B, and HLTH 472 must be on a nutrition topic and approved in advance by the course supervisor and associate chair, undergraduate studies.
3. If students take both KIN 343 and KIN 346, then one course will be counted as a required course and one as an elective course

Appendix E: Faculty of Mathematics

November 21, 2023

SENATE UNDERGRADUATE COUNCIL

Submission by the Faculty of Mathematics

1. Course Changes
 - 1.1. CS 335
 - 1.2. CS 484
 - 1.3. CS 489
 - 1.4. COMM 431
 - 1.5. MATBUS 470
2. Academic Plan Changes (Minor Modifications)
 - 2.1. Honours Combinatorics and Optimization
 - 2.2. Bioinformatics Specialization [BCS and BMath (CS)]
 - 2.3. Bachelor of Computer Science Data Science
 - 2.4. Business Administration & Computer Science Double Degree
 - 2.5. Human Computer Interaction Specialization [BCS, BMath (CS), BSE]
 - 2.6. Software Engineering Specialization [BCS and BMath (CS)]
 - 2.7. Honours Fallback Provision

COURSE CHANGES (for approval)

Computer Science - David R. Cheriton School of

Current Catalog Information

CS 335 (0.50) LEC, TST Computational Methods in Business and Finance

An introduction to numerical methods for business and finance. Floating-point arithmetic, interpolation. Methods for portfolio optimization and contingent-claims valuation. Solution of nonlinear equations. Monte Carlo methods, lattice methods, simulation of hedging strategies.

No Special Consent Required

Requisites :

Prereq: One of CS 116, 136, 138, 146; CS 114 with at least 60%; CS 115 or CS 135; MATH 136 or 146; MATH 237 or 247; One of STAT 206, 231, 241; Not open to Computer Science students. Antireq: AMATH 242/CS 371, CS 30, MTE 204

Effective 02-SEP-2024

Requisite Change :

Prereq: One of CS 116, 136, 138, 146; CS 114 with at least 60%; CS 115 or CS 135; **One of MATH 106 with at least 70%**, MATH 136, 146; MATH 237 or 247; One of STAT 206, 231, 241; Not open to Computer Science students. Antireq: AMATH 242/ CS 371, CS 370, MTE 204

Rationale :

Update prerequisites so that CS 335 may be taken by FARM students who achieve a passing but low grade in MATH 135. Such a low grade prevents students from taking MATH 136 (Linear Algebra 1 for Honours Mathematics), but they can still take MATH 106 (Applied Linear Algebra 1). The threshold of 70% is chosen to parallel the requirement of MATH 235 (Linear Algebra 2 for Honours Mathematics).

Current Catalog Information

CS 484 (0.50) LAB, LEC, TST Computational Vision

Introduction to image and vision understanding by computer. Camera-system geometry, image formation and lighting, and image acquisition. Basic visual processes for recognition of edges, regions, lines, and surfaces. Processing of stereo images, and motion in image sequences. Object recognition. Applications of computer-vision systems. [Note: Lab is not scheduled and students are expected to find time in open hours to complete their work.]

No Special Consent Required

Requisites :

Prereq: (One of AMATH 242/CS 371, CS 370, MATH 235, MATH 245) and (One of STAT 206, STAT 230 or 240); Computer Science students only

Effective 01-SEP-2024

Requisite Change :

Prereq: (One of AMATH 242/CS 371, CS 370, MATH 235, MATH 245) and (One of STAT 206, STAT 230 or 240); Computer Science students **and BMath (Data Science)** students only

Rationale : The topic of CS 484, Computational Vision, depends heavily on techniques in data science, and conversely is a prominent application of data science techniques. In particular, it complements CS 480, CS 485, and CS 486, which teach the foundations of machine learning and AI, by providing a motivation for and an important application of those foundations. Therefore the addition of CS484 is appropriate to data science plans.

Current Catalog Information

CS 489 (0.50) LEC, TUT Advanced Topics in Computer Science

See the Course Offerings List for topics available.

No Special Consent Required

Requisites : Prereq: Level at least 3B; Computer Science students only

Effective 01-SEP-2024

Component Change: LAB, LEC, TST, TUT

Rationale : Adding a Lab and TST slot gives CS department and potential instructors flexibility to offer more variety of special topics courses.

Dean of Mathematics

Current Catalog Information

COMM 431 (0.50) LEC, TUT Project Management

This course will introduce students to approaches, techniques, and terminology used in project management. In particular, students will learn project planning principles, product and process metrics, people and organizational issues, task allocation and scheduling, monitoring and control, change management, and methods for cost estimation and risk assessment. Students will also be introduced to current project management tools, and will manage their own term project.

No Special Consent Required

Requisites : Prereq: AFM 102, MSCI 211; Level at least 3A

Effective 01-SEP-2024

Requisite Change : Prereq: AFM 102, (MSCI 211 or PSYCH 238); Level at least 3A

Rationale : Students in the Math/Business Administration single degree plan are required to take one of MSCI 211 or PSYCH 238 which are antirequisites. Currently, if a student takes PSYCH 238 then the Registrar's office needs to override the student into COMM 431. By implementing this change, we reduce the workload for the Registrar's office and advisors.

Current Catalog Information

MATBUS 470 (0.50) LAB, LEC, TST Derivatives

Overview of the derivatives markets. Pricing of derivatives, including futures, forwards, swaps, and options. Hedging vs. speculating. Option Greeks. Trading strategies. Case studies.

No Special Consent Required

Requisites : Prereq: (One of AFM 275/AFM 372/ACTSC 391, ACTSC 371, BUS 393W), (STAT 334 or (STAT 330 and 333)). Antireq: AFM 322/474, ACTSC/STAT 446, BUS 423W,

Effective 01-SEP-2024

Requisite Change :

Rationale :

ECON 372

Prereq: (One of AFM 275/AFM 372/ACTSC 391, ACTSC 371, [ACTSC 372](#), BUS 393W),(STAT 334 or (STAT 330 and 333)).

ACTSC 371 will be discontinued in the Fall 2023 calendar year, with W23 being the last planned offering. MATBUS 470 enrolment mainly consists of FARM students, for whom MATBUS 470 is a program required course. FARM students normally take ACTSC 371 to satisfy the corresponding MATBUS 470 prerequisite. We propose to allow ACTSC 372 in place of ACTSC 371. This change provides FARM students with uninterrupted access to MATBUS 470 since ACTSC 372 is now a required class for FARM students.

End of Report

2. Academic Plan Changes (Minor Modification)

2.1 Honours Combinatorics and Optimization

Motion and rationale: Effective September 2024, modify the requirement “Two additional math courses (1.0 units) from ACTSC, AMATH, CS, MATBUS, MATH, PMATH, or STAT” in the **Combinatorics and Optimization** degree requirements to add the phrase “*excluding courses cross-listed with a CO course.*” This has always been the operational process but was erroneously/accidentally left out of the Calendar.

Affected page: <https://ugradcalendar.uwaterloo.ca/page/MATH-Combinatorics-and-Optimization2>

[...]

- Two additional 300- or 400-level math courses (1.0 unit) from ACTSC, AMATH, CS, MATBUS, MATH, PMATH, or STAT *excluding courses cross-listed with a CO Course.*
- One additional 300- or 400-level math course (0.5 unit) from ACTSC, AMATH, CO, CS, MATBUS, MATH, PMATH, or STAT
- Three additional math courses (1.5 units) from ACTSC, AMATH, CO, CS, MATBUS, MATH, PMATH, or STAT

2.2 Bioinformatics Specialization [Bachelor of Computer Science (BCS) and Bachelor of Mathematics (BMath) (Computer Science)]

Motion and Rationale: Effective 1 September 2024, replace BIOL 309 with BIOL 308 Principles of Molecular Biology in the Bioinformatics Specialization. BIOL309 is in the process of being inactivated formally. The inactivation has been approved by the Biology department and will go to Science Faculty Council on October 3, 2023. BIOL308 is the closest suitable match and the replacement course was recommended by Brendan McConkey (Associate Chair Undergraduate Studies in Biology); CS colleagues working in bioinformatics agreed with the choice.

(<https://ugradcalendar.uwaterloo.ca/page/MATH-Computer-Sci-Bioinformatics-Spec>)

The Bioinformatics Specialization is available for both the Bachelor of Computer Science (BCS) and the Bachelor of Mathematics (BMath) (Computer Science) academic plans. The requirements are the same as for the BCS and BMath (CS) academic plans except that:

1. Elective breadth and depth requirements are waived, and
2. Both academic plans include the following additional requirements.
 - All of
 - BIOL 130 Introductory Cell Biology
 - BIOL 130L Cell Biology Laboratory
 - BIOL 239 Genetics
 - BIOL 240 Fundamentals of Microbiology
 - BIOL 240L Microbiology Laboratory
 - ~~BIOL 309 Analytical Methods in Molecular Biology~~
 - BIOL 308 Principles of Molecular Biology
 - BIOL 365 Methods in Bioinformatics
 - BIOL 465 Structural Bioinformatics
 - CHEM 120 General Chemistry 1
 - CHEM 120L General Chemistry Laboratory 1
 - CHEM 123 General Chemistry 2
 - CHEM 123L General Chemistry Laboratory 2
 - CS 482 Computational Techniques in Biological Sequence Analysis

2.3 Bachelor of Computer Science Data Science

Motion and Rationale: Effective 1 September 2024, add CS 484 (Computational Vision) to the “One additional course from the following list” in the BCS (Data Science) plan. As computational vision is one of the key applications of data science, the addition of CS 484 is appropriate and desired.

Note that SUC saw, and approved, the addition of CS 484 to the BMath Data Science plan at the 9 May 2023 meeting.

(<https://ugradcalendar.uwaterloo.ca/page/MATH-Bachelor-of-Computer-Science-Data-Science>)

[...]

- One additional course from the following list
 - [CS 448](#) Database Systems Implementation
 - [CS 454](#) Distributed Systems
 - [CS 480](#) Introduction to Machine Learning
 - [CS 484](#) Computational Vision
 - [CS 485](#) Statistical and Computational Foundations of Machine Learning
 - [CS 486](#) Introduction to Artificial Intelligence

[...]

2.4 Business Administration & Computer Science Double Degree

Effective 1 September 2024, a number of changes to the Business Administration & Computer Science Double Degree (BBA/BCS) are needed due to changes made by the Wilfred Laurier University (WLU) Lazaridis School of Business and Economics:

- BUS 352W is renumbered BUS 252W
- BUS 362W is renamed Applied Marketing
- BUS 481W is renumbered BUS 381W

Furthermore, the requirement for one of ECON 250W or ECON 260W is removed, and an additional BUS or ENTR elective is required. WLU’s rationale for removing EC 250 (ECON 250W) or EC 260 (ECON 260W) is driven by the areas and based on student feedback. The only area that requires the content of these courses is Finance which has included the courses in its list of required electives. Students surveyed as part of the cyclical review, identified these two courses as the least valuable of all their courses. In its place, we will have a business elective which a student can use to broaden their horizon to take courses that could be geared towards their interests including courses on negotiation, conflict resolution.

The number of required units is unchanged.

Note that SUC saw, and approved, the exact same change to BBA/BMATH Double Degree at the 9 May 2023 meeting.

(<https://ugradcalendar.uwaterloo.ca/page/MATH-Business-Admin-Computer-Sci-Double-Degree-1>)

[...]

From Wilfrid Laurier University (Laurier)

- All of
 - BUS 111W Understanding the Business Environment

- BUS 121W Functional Areas of the Organization
- BUS 127W Introduction to Financial Accounting
- BUS 231W Business Law
- BUS 247W Managerial Accounting
- [BUS 252W Introduction to Marketing Management](#)
- BUS 283W Financial Management I
- BUS 288W Organizational Behaviour I
- ~~BUS 352W Introduction to Marketing Management~~
- BUS 354W Human Resources Management
- [BUS 362W Applied Marketing Building and Managing Products, Services and Brands](#)
- BUS 375W Operations Management
- [BUS 381W Business Policy I](#)
- BUS 393W Financial Management II
- BUS 398W Organizational Behaviour II
- ~~BUS 481W Business Policy I~~
- BUS 491W Business Policy II
- ECON 120W Introduction to Microeconomics
- ECON 140W Introduction to Macroeconomics
- ~~One of~~
 - ~~ECON 250W Intermediate Macroeconomic Analysis for Management~~
 - ~~ECON 260W Intermediate Microeconomic Analysis for Management~~
- ~~Six~~ [Seven](#) additional 300- or 400-level BUS or ENTR elective courses (~~3-0~~ [3.5](#) units) taken in third, fourth, or fifth year.

[...]

2.5 Human Computer Interaction Specialization [Bachelor of Computer Science (BCS), Bachelor of Mathematics (BMath) (Computer Science), and Bachelor of Software Engineering (BSE)]

Motion and rationale: Effective 1 September 2024, update plan requirements in the Human Computer Interaction Specialization plan requirements by adding course overlooked when the specialization was last updated, or that were at the time non-existent. These additions also allow students more options. The change are

- adding **FINE 100 Studio Fundamentals** and **INTEG 121 Collaboration, Design Thinking, and Problem Solving** to the “Two of” list that already contains similar courses;
- Modify the “Two of” list of technical courses by adding **CS 486 Introduction to Artificial Intelligence** as a possibility and by removing **CS 485 Statistical and Computational Foundations of Machine Learning** as an alternative to **CS 480 Introduction to Machine Learning** from the first “Two of” list.
- Allow a variety of alternatives to **CS 492 The Social Implications of Computing** to help break down perceived barriers between CS and other departments:
 - SOC 232 Technology and Social Change;
 - GSJ 205 Technology, Gender, and Social Justice;
 - STV 202 Design and Society;
 - STV 205 Cybernetics and Society;
 - STV 208 Artificial Intelligence and Society: Impact, Ethics, and Equity;
 - STV 210 The Computing Society;
 - STV 302 Information Technology and Society;
 - STV 304 Technology in Canadian Society;
 - STV 305 Technology, Society and the Modern City;

- STV 306 Biotechnology and Society;
- PACS 315 Engineering and Peace;
- BET 360 Design Frameworks for Social Ventures;
- MSCI 442 Impact of Information Systems on Organizations and Society

Department Approval for inclusion obtained from:

- Conrad School for Entrepreneurship & Business for BET 360
- Centre for Society, Technology and Values for STV 202, STV 205, STV 208, STV 210, STV 302, STV 304, STV 305, and STV 306
- Department of Management Sciences for MSCI 422 and MSCI 442
- Department of Philosophy for GSJ 205
- Department of Peace and Conflict studies for PACS 315
- Sociology and Legal Studies for SOC 232

(<https://ugradcalendar.uwaterloo.ca/page/MATH-Computer-Sci-Human-Computer-Interaction-Spec>)

The HCI Specialization is available for Bachelor of Computer Science (BCS), Bachelor of Mathematics (Computer Science) (BMath), and Bachelor of Software Engineering (BSE) academic plans. The course requirements are the same as for the BCS, BMath (CS), and BSE academic plans with the following additional requirements:

- All of
 - CS 349 User Interfaces
 - CS 449 Human-Computer Interaction
 - ~~CS 492 The Social Implications of Computing~~
- One of
 - CS 492 The Social Implications of Computing
 - SOC 232 Technology and Social Change
 - GSJ 205 Technology, Gender, and Social Justice
 - STV 202 Design and Society
 - STV 205 Cybernetics and Society
 - STV 208 Artificial Intelligence and Society: Impact, Ethics, and Equity
 - STV 210 The Computing Society
 - STV 302 Information Technology and Society
 - STV 304 Technology in Canadian Society
 - STV 305 Technology, Society and the Modern City
 - STV 306 Biotechnology and Society
 - PACS 315 Engineering and Peace
 - BET 360 Design Frameworks for Social Ventures
 - MSCI 442 Impact of Information Systems on Organizations and Society
- Two of
 - CS 445/ECE 451 or SE 463 Software Requirements Specification and Analysis
 - CS 446/ECE 452 or SE 464 Software Design and Architectures
 - CS 447/ECE 453 Software Testing, Quality Assurance, and Maintenance or SE 465 Software Testing and Quality Assurance
 - CS 453 Software and Systems Security or CS 459 Privacy, Cryptography, and Network Security
 - CS 454 Distributed Systems
 - CS 480 Introduction to Machine Learning or ~~CS 485 Statistical and Computational Foundations of Machine Learning~~

- [CS 484](#) Computational Vision
- [CS 486](#) Introduction to Artificial Intelligence
- [CS 488](#) Introduction to Computer Graphics
- Two of
 - [ENGL 108D](#) Digital Lives
 - [ENGL 293](#) Introduction to Digital Media Studies
 - [ENGL 295](#) Social Media
 - [FINE 100](#) Studio Fundamentals
 - [FINE 150](#) Appreciation and Expression
 - [FINE 257](#) Video, New Media and the Digital Turn
 - [INTEG 121](#) Collaboration, Design Thinking, and Problem Solving
 - [INTEG 251](#) Creative Thinking
 - [KIN 320](#) Task Analysis
 - [PSYCH 207](#) Cognitive Processes
 - [PSYCH 261](#) Physiological Psychology
 - [STAT 332](#) Sampling and Experimental Design
 - [STAT 430](#) Experimental Design

2.6 Software Engineering Specialization [Bachelor of Computer Science (BCS) and Bachelor of Mathematics (BMath) (Computer Science)]

Motion and Rationale: Effective 1 September 2024, create a new “One of” list that increases the range of courses about how software impacts society by listing CS 492 The Social Implications of Computing, BET 360 Design Frameworks for Social Ventures, BET 420 Entrepreneurship for Social Impact, ENVS 205 Sustainability: The Future We Want, GEOG 207 Climate Change Fundamentals, GEOG 306 Human Dimensions of Natural Hazards, GSJ 205 Technology, Gender, and Social Justice, MSCI 422 Economic Impact of Technological Change and Entrepreneurship, MSCI 442 Impact of Information Systems on Organizations and Society, PACS 315 Engineering and Peace, SOC 232 Technology and Social Change, SOC 324 Digital Cultures, STV 202 Design and Society, and STV 205 Cybernetics and Society. An additional benefit is the breakdown of perceived barriers between CS and other academic disciplines.

Department Approval for inclusion obtained from:

- Conrad School for Entrepreneurship & Business for BET 360 and BET 420
- Geography and Environmental Management for ENVS 205, GEOG 207, and GEOG 306
- Centre for Society, Technology and Values for STV 202, STV 205, and STV 306
- Department of Management Sciences for MSCI 422 and MSCI 442
- Department of Philosophy for GSJ 205
- Department of Peace and Conflict studies for PACS 315
- Sociology and Legal Studies for SOC 232 and SOC 324

(<https://ugradcalendar.uwaterloo.ca/page/MATH-Computer-Sci-Software-Engineering-Spec>)

[...]

Foundations

- All of
 - [CS 445/ECE 451](#) Software Requirements Specification and Analysis

- [CS 446/ECE 452 Software Design and Architectures](#)
 - [CS 447/ECE 453 Software Testing, Quality Assurance and Maintenance](#)
 - ~~[CS 492 The Social Implications of Computing](#)~~
 - One of
 - [CS 492 The Social Implications of Computing](#)
 - [BET 360 Design Frameworks for Social Ventures](#)
 - [BET 420 Entrepreneurship for Social Impact](#)
 - [ENVS 205 Sustainability: The Future We Want](#)
 - [GEOG 207 Climate Change Fundamentals](#)
 - [GEOG 306 Human Dimensions of Natural Hazards](#)
 - [GSJ 205 Technology, Gender, and Social Justice](#)
 - [MSCI 422 Economic Impact of Technological Change and Entrepreneurship](#)
 - [MSCI 442 Impact of Information Systems on Organizations and Society](#)
 - [PACS 315 Engineering and Peace](#)
 - [SOC 232 Technology and Social Change](#)
 - [SOC 324 Digital Cultures](#)
 - [STV 202 Design and Society](#)
 - [STV 205 Cybernetics and Society](#)
 - [STV 306 Biotechnology and Society](#)
- [...]

2.7 Honours Fallback Provision

Effective 1 September 2024, add a note allowing students who have satisfied the requirements of the 3 Year General Degree and Co-op requirements to graduate with a Co-op designation. Add to Note number one a rationale for a returning student not being able to have the co-op designation on the upgraded degree. If we were to move the credential to a new degree/parchment then that would be changing the original degree that was accepted; which is unacceptable as the degree represents a formal consent and changes to that consent will not be made per university policy: <https://ugradcalendar.uwaterloo.ca/page/Acad-Regs-Student-Responsibility>. The Honours fallback provision was approved at SUC in June 2008, effective September 2009. The rationale in the packages still available in our archives did not explain why this was restricted to regular only. Discussions with S&P and AD Co-op led to the conclusion that this might have been an oversight at the time that the Fallback Provision was created. Perhaps it was simply not anticipated that a student claiming the three-year degree might already have completed 8 full-time study terms.

(<https://ugradcalendar.uwaterloo.ca/page/MATH-Degree-Requirements-for-Math-students>)

- [...]
- Honours Fallback Provision**
- Students who have, at any time, satisfied all of the following conditions may elect to graduate with a Bachelor of Mathematics (BMath) Three-Year General degree (~~regular~~):
- [...]
- One of
 - [STAT 221](#) Statistics (Non-Specialist Level)
 - [STAT 231](#) Statistics
 - [STAT 241](#) Statistics (Advanced Level)

Students who have also satisfied the Co-op requirements for an Honours degree (at least 2.5 COOP course units, at least 2.5 PD course units (including PD1 and PD11), and at least 8 full-time study terms), may elect to graduate with a BMath Three-Year General degree (co-op).

Notes

1. Graduates who were previously awarded a general degree may apply for readmission to upgrade to an honours degree, provided that at least three terms have passed since their last term of enrolment. These applications will be considered on a case-by-case basis. Courses and grades from the general degree would be used towards the upgraded degree if applicable, but students would otherwise need to meet current Calendar requirements. *Students who opt to return to upgrade their degree from General Co-op to Honours cannot have the co-op designation added to the Honours degree.*
2. Students choosing the Honours Fallback Provision may not combine this choice with any specialization, option, or minor.

WATERLOO | ENGINEERING

Engineering Undergraduate Office

M E M O R A N D U M

November 21, 2023

TO: Tim Weber-Kraljevski, Associate University Secretary, Secretariat

FROM: Jason Grove, Associate Dean, Undergraduate Studies, Faculty of Engineering
Cecilia Cotton Associate Dean, Undergraduate Studies, Faculty of Mathematics

SUBJECT: Items for Approval at November 21, 2023 Senate Undergraduate Council

ALL CURRICULUM CHANGES ARE EFFECTIVE SEPTEMBER 2024 UNLESS OTHERWISE NOTED.

1. Academic Plans (Minor Modifications)

[For Approval]

1.1 Software Engineering

1. Academic Plans (Minor Modifications) [for approval]

1.1. Software Engineering

Summary:

Minor Modifications

Update Advanced Technical Elective list

Background & Rationale:

Two new courses were recently approved at SUC from Math (CS453 & CS459). These courses will complement the Software Engineering Advanced Technical Elective List. Removing CS 458 (Computer Security and Privacy) as it will become inactive with the Math requested changes.

Software Engineering

Mark UP

.....

Advanced Technical Electives

The three advanced technical electives (ATEs) comprise fourth-year CS or ECE course offerings. Students are advised to plan ahead when selecting ATEs. Most ATEs are not offered every term, and some ATEs have other ATEs as prerequisites. The academic advisors may approve other courses.

CS List

One of the following CS courses:

- **CS 360** Introduction to the Theory of Computing
- **CS 365** Models of Computation
- **CS 370** Numerical Computation
- **CS 371/AMATH 242** Introduction to Computational Mathematics
- **CS 442** Principles of Programming Languages
- **CS 444** Compiler Construction
- **CS 448** Database Systems Implementation
- **CS 449** Human-Computer Interaction
- **CS 450** Computer Architecture
- **CS 451** Data-Intensive Distributed Computing
- **CS 452** Real-time Programming
- **CS 453 Software and Systems Security**
- **CS 454** Distributed Systems
- **CS 457** System Performance Evaluation
- ~~CS 458 Computer Security and Privacy~~
- **CS 459 Privacy, Cryptography, Network and Data Security**
- **CS 462** Formal Languages and Parsing
- **CS 466** Algorithm Design and Analysis
- **CS 479** Neural Networks
- **CS 480** Introduction to Machine Learning
- **CS 484** Computational Vision
- **CS 485** Statistical and Computational Foundations of Machine Learning
- **CS 486** Introduction to Artificial Intelligence
- **CS 487** Introduction to Symbolic Computation
- **CS 488** Introduction to Computer Graphics

- **CS 489** Advanced Topics in Computer Science

.....

Advanced Technical Electives

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CS List

One of the following CS courses:

- **CS 360** Introduction to the Theory of Computing
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- **CS 444** Compiler Construction
- **CS 448** Database Systems Implementation
- **CS 449** Human-Computer Interaction
- **CS 450** Computer Architecture
- **CS 451** Data-Intensive Distributed Computing
- **CS 452** Real-time Programming
- **CS 453** Software and Systems Security
- **CS 454** Distributed Systems
- **CS 457** System Performance Evaluation
- **CS 459** Privacy, Cryptography, Network and Data Security
- **CS 462** Formal Languages and Parsing
- **CS 466** Algorithm Design and Analysis
- **CS 479** Neural Networks
- **CS 480** Introduction to Machine Learning
- **CS 484** Computational Vision
- **CS 485** Statistical and Computational Foundations of Machine Learning
- **CS 486** Introduction to Artificial Intelligence
- **CS 487** Introduction to Symbolic Computation
- **CS 488** Introduction to Computer Graphics
- **CS 489** Advanced Topics in Computer Science

Two-Year Progress Report

Global Business and Digital Arts (BGBDA) and Digital Experience Innovation (MDEI)

February 2023

Background

The first cyclical review for Global Business and Digital Arts (BGBDA) and Digital Experience Innovation (MDEI) was concluded in October 2020. In accordance with the University of Waterloo's Institutional Quality Assurance Process, a Final Assessment Report, which provides a synthesis of the external evaluation and the internal response of the programs (BGBDA, MDEI) delivered by the Stratford School of Interaction Design & Business (Stratford School), was approved by Senate Graduate and Research Council in January 2021. Prior to this, the Stratford School conducted a self-assessment and the Quality Assurance Office invited two external reviewers, Dr. James Nadler, Professor and Chair, School of Creative Industries, Ryerson University, and Dr. Stanley Ruecker, Professor, Department of Art and Design, University of Illinois, to assess the academic programs through an arms-length review process that resulted in 16 recommendations. The progress of the program in implementing these recommendations is provided below.

Enrollment over the past two years

| | Honours | Grad |
|-------------------------------|---------|------|
| 2021-2022 (CURRENT YR) | 180 | 42 |
| 2020-2021 (LAST YR) | 183 | 54 |

Progress on Implementation Plan

Recommendations

1. Transportation for students needs to be improved from Waterloo. Since the cancellation of the Greyhound line there is no public transportation service between Kitchener-Waterloo and Stratford. The proposed addition of a GO-Bus service would make a significant difference.

Status: **in progress**

Details: Due to the pandemic, our progress for increased transportation has been slowed, however, the City of Stratford has implemented a new bus route from Stratford to Kitchener/Waterloo that runs several times a day. The closest stop to the UW campus is Conestoga Mall in Waterloo, however, the UW campus is not yet served directly. We have also identified a private provider in Stratford with whom we have entered into negotiations to offer ride-share options to our students.

2. As many students will continue to commute from Waterloo, avoid wherever possible the scheduling of evening classes especially in winter term. This is a safety issue as the backroads are treacherous in the snowbelt. Faculty members report that their cars often left the road for the ditch in the winter. Currently, only one faculty member lives in Stratford and the others split their time between the Stratford campus and the departments at Waterloo where they are cross-appointed.

Status: **in progress**

Details: We are addressing this issue in several ways:

- We have engaged a private shuttle service temporarily to offer student transportation to the Stratford School.
- A bus route from Waterloo to Stratford is now available, which helps to mitigate this issue somewhat.
- We are actively working with the Dean of Arts and the Provost's office to build University owned and run student accommodation in Stratford.
- The approval of a residence building will enable us to move our first-year students to the Stratford School as well.

All three solutions will mitigate the risks that come with commuting to/from the Stratford School. As we appoint more faculty members to the Stratford School, the number of Stratford School employees residing in Stratford is slowly growing (currently 3 faculty members and about 50% of staff).

3. Improve the administrative connection with the Waterloo main campus. Students and faculty seem to have a sense of isolation. In other words, recognize and fully accommodate the satellite nature of the school.

Status: **completed**

Details: The Stratford School became an administrative and academic unit in July 2018 and is now integrated into the Faculty of Arts on par with the other Schools and Departments of the Faculty. This means that we have representation on all major committees in the Faculty of Arts and a voice at the table in the same way that all Arts units do.

4. Establish a Program Advisory Board drawn from industry and government of experts who could serve as program advisors, employers, and potential donors. This will help the programs avoid falling behind industry trends.

Status: **completed**

Details: The Advisory Board has been established and the first meeting was held on May 5, 2022. The Advisory Board consists of 10 members from academia, industry, and the City of Stratford. The Advisory Board will meet twice a year, once in the spring and once in the fall. Current members are:

| First Name | Last Name | Salutation | Title | Organization Name |
|------------|------------------|------------|-------------------------------------|--|
| Christine | McWebb | Dr. | Director and Professor, Board Chair | University of Waterloo, Stratford School |
| Sheila | Ager | Dr. | Dean of Arts | University of Waterloo |
| Dan | Mathieson | Mr. | Mayor | City of Stratford |
| Markus | Grupp | Mr. | Senior Director | Kira Systems |
| Jorge | Fernandes | Mr. | CTO | Rogers |
| Danny | Ho | Mr. | Director | LCBO |
| Brad | Clarence | Mr. | Senior Interaction Designer | Google Nest |
| Ellyn | Winters-Robynson | Ms. | President and CMO | Ignition |
| Deepika | Malik | Ms. | Transformational Design Leader | Sunlife |
| Alex | Chepovetsky | Mr. | President | Havas |
| Richmond | Sedcole | Mr. | in transition | in transition |
| Leah | Zhang-Kennedy | Dr. | Assistant Professor | Stratford School |

- Develop program outcomes that are explicitly keyed to individual course learning outcomes and deliverables: a course mapping exercise. The Center for Teaching Excellence can help to organize this. Tie this back to the messaging of the program. We suggest that the School consider specific program outcomes for MDEI and how they differ from the undergraduate program.

Status: **completed**

Details: Course learning outcomes and deliverables for GBDA as well as program outcomes for Master's in Digital Experience Innovation (MDEI) have been completed and were attached as appendices to the Final Assessment Report.

- We appreciate that the School conducted a major curricular review two years ago. Allow the current curricular changes of two years ago to play out and be analyzed for a year or two before tackling any further major changes.

Status: **in progress**

Details: As of fall 2021, the former GBDA curriculum has been phased out, and we continue to monitor the success of the new GBDA curriculum. We will conduct the next internal review to evaluate the changes made in 2022-23.

7. We suggest that the School strongly consider, if at all possible, extending the summer internship into a full co-op option.

Status: **completed**

Details: Intake of the first GBDA cohort into co-op, which is now mandatory for the program, began in fall 2022.

8. Continue to expand the business side of the curriculum, especially dealing with finance.

Status: **completed**

Details: An introductory course in business financials (GBDA 311) was added to the BGBDA curriculum and was offered for the first time in the 2020-2021 academic year.

9. Explore opening up more electives to allow students to specialize more than is currently possible in a highly prescribed undergraduate program. We would suggest allowing undergraduates in third year be allowed to take two or three electives within BGBDA. This would allow those interested students to explore business or design in more depth.

Status: **completed**

Details: We currently offer 2-3 electives on-site for our students at the Stratford School. With the increased number of online offerings, students have a broader choice for electives either on or off-campus.

10. In new tenure track hires, try to recruit faculty with formal training in Design.

Status: **in progress**

Details: We hired one tenure-track Assistant Professor in Design in 2020 (Dr. Leah Zhang-Kennedy), two in 2021 (Drs. Ville Makela, Cayley MacArthur), and one in fall 2022 (Dr. Lauren Kilgour). We plan to hire one more for fall 2023 and are awaiting the Provost's approval to post this position in Design and Technology.

11. Do an inventory on what services would be important for Stratford campus and do those right. For example, does Stratford need some kind of food bank for its students?

Status: **completed**

Details: We have completed an initial analysis of services and continue to monitor what services are needed as the campus grows. Currently, we offer:

- Food bank
- On-site and off-site counselling (through the Counselling office on main campus)
- Accessibility Services (through main campus)
- Safe-ride program for students residing in Stratford
- Medical Services (through the Stratford Hospital Medical Services and the University's Health Services)

12. Find some way to provide an introduction of the students to the library. Reinstate library services as part of the orientation program for both undergraduates and masters students. Increase classroom invitations to librarians; explore some librarian office hours on site.

Status: **completed**

Details: The Stratford School will continue to work with the Dana Porter Library to provide opportunities for our students to visit the library facilities. Resources are also shipped to the Stratford School through Interlibrary Loans. There are no plans to have an onsite librarian at the Stratford School. This resource would not be utilized because the current loan system with delivery to the Stratford School works well. However, library visits and tours are encouraged during Orientation for incoming students.

13. Increase on-site hours for student counselors.

Status: **completed**

Details: The on-site counsellor is available on Fridays from 8.30 to 4.30 pm and off-site by appointment through the University's counselling services. At the time of the cyclical review, the counsellor was here on a bi-weekly basis.

14. We encourage the School to arrange new spaces for classes, accommodation, and student life. For example, we suggest that the University could support the creation of local student clubs, and provide them with space. Provide or support student events that might also attract other students from main campus. We recognize and appreciate that the School and University are already planning to rent more space in Stratford for these purposes and working with a private developer to build apartment spaces appropriate for the students and that can compete with quality of rental accommodation available in Waterloo.

Status: **in progress**

Details: The Director has submitted a proposal to the Dean of Arts for student accommodation which will have integral student life, performance and maker spaces. It is our aim to have a student residence in place by fall 2025.

15. For the MDEI candidates, we suggest establishing some course work and formal networking opportunities in Toronto.

Status: **incomplete**

Details: The MDEI program has been moved to a fully online program, with students being remote. Because of this change in delivery modality and the high number of international students in the program, no formal networking opportunities have been planned for this program.

16. Consider development of a research masters and PhD to enrich the curriculum and extend the reach of the program.

Status: **in progress**

Details: We have developed a new Master's and PhD program in User Experience Research and Design to be launched in fall 2024. Both programs have been reviewed by the Faculty of Arts' Dean's office and the Graduate Advisory Group, with very positive feedback, and will now be submitted for approval at the University level.

Updated Implementation Plan

| | Recommendations | Proposed Actions | Responsibility for Leading and Resourcing (if applicable) the Actions | Timeline for addressing Recommendations |
|----|---|--|--|--|
| 1. | Transportation for students needs to be improved from Waterloo. Since the cancellation of the Greyhound line there is no public transportation service between Kitchener-Waterloo and Stratford. The proposed addition of a Go-Bus service would make a significant difference. Add updates here | Add updates here <ul style="list-style-type: none"> New bus route added Partnership with private provider | Director, Stratford School Dean of Arts City of Stratford Add updates here | In progress – 2022-23 |
| 2. | As many students will continue to commute from Waterloo, avoid wherever possible the scheduling of evening classes especially in winter term. This is a safety issue as the backroads are treacherous in the snowbelt. Faculty members report that their cars often left the road for the ditch in the winter. Currently, only one faculty member lives in Stratford and the others split their time between the Stratford campus and the departments at Waterloo where they are cross-appointed. | <ul style="list-style-type: none"> Offer certain courses online or in hybrid format Add University run and operated student accommodation Move 1st year GBDA to Stratford School | Director, Stratford School | In progress – Fall 2025 |
| 3. | Improve the administrative connection with the Waterloo main campus. Students and faculty seem to have a sense of isolation. In other words, recognize and fully accommodate the satellite nature of the school. | <ul style="list-style-type: none"> Establish stronger administrative connection with main campus | Dean of Arts Director, Stratford School | Complete – effective July 1, 2018, the Stratford School of Interaction Design & Business obtained official status as a School. |
| 4. | Establish a Program Advisory Board drawn from industry and government of experts who could | <ul style="list-style-type: none"> Establish a Program Advisory Board | Director, Stratford School | In progress – Fall 2025 |

| | | | | |
|-----|--|--|--|---|
| 5. | Develop program outcomes that are explicitly keyed to individual course learning outcomes and deliverables: a course mapping exercise. The Center for Teaching Excellence can help to organize this. Tie this back to the messaging of the program. We suggest that the School consider specific program outcomes for MDEI and how they differ from the undergraduate program. | <ul style="list-style-type: none"> Articulate program outcomes and learning goals | Director, Stratford School Centre for Teaching Excellence Curriculum committee | Complete – GBDA Learning Outcomes Complete – MDEI Learning Outcomes |
| 6. | We appreciate that the School conducted a major curricular review two years ago. Allow the current curricular changes of two years ago to play out and be analyzed for a year or two before tackling any further major changes. | <ul style="list-style-type: none"> Conduct review of impact of curriculum changes | Director, Stratford School Curriculum committee | In progress; 2022-2023 |
| 7. | We suggest that the School strongly consider, if at all possible, extending the summer internship into a full co-op option | <ul style="list-style-type: none"> Introduce full co-op option for BGBDA | Director, Stratford School CEE | Complete - 2022 |
| 8. | Continue to expand the business side of the curriculum, especially dealing with finance. | <ul style="list-style-type: none"> Offer introductory course in business financials (GBDA 311) | Director, Stratford School | Complete - 2020-2021 |
| 9. | Explore opening up more electives to allow students to specialize more than is currently possible in a highly prescribed undergraduate program. We would suggest allowing undergraduates in third year be allowed to take two or three electives within BGBDA. This would allow those interested students to explore business or design in more depth. | <ul style="list-style-type: none"> We will offer one elective in 2019-20, steadily increasing the number to 3-5 electives per term. | Director, Stratford School Curriculum committee | Complete - 2021-2022 |
| 10. | In new tenure track hires, try to recruit faculty with formal training in Design. | <ul style="list-style-type: none"> Hire Faculty in Design | Director, Stratford School Dean of Arts, SACA | In progress: Hired 4 faculty in Design – 2020-22; will hire one more, 2023-24 |

| | | | | |
|-----|--|--|--|-------------------------|
| 11. | Do an inventory on what services would be important for Stratford campus and do those right. For example, does Stratford need some kind of food bank for its students? | <ul style="list-style-type: none"> • Conduct inventory of needed services | Administrative Officer | Complete - winter 2020 |
| 12. | Find some way to provide an introduction of the students to the library. Reinstate library services as part of the orientation program for both undergraduates and masters students. Increase classroom invitations to librarians; explore some librarian office hours on site. | <ul style="list-style-type: none"> • completed an initial analysis of services and continue to monitor what services are needed as the campus grows | Administrative Officer | Complete - winter 2020 |
| 13. | Increase on-site hours for student counselors. | <ul style="list-style-type: none"> • Presence of 1 counsellor only due to staffing challenges in Counselling Services • Increased online counselling hours | Director, Stratford School Counselling Services | Complete - winter 2022 |
| 14. | We encourage the School to arrange new spaces for classes, accommodation, and student life. For example, we suggest that the University could support the creation of local student clubs, and provide them with space. Provide or support student events that might also attract other students from main campus. We recognize and appreciate that the School and University are already planning to rent more space in Stratford for these purposes and working with a private developer to build apartment spaces appropriate for the students and that can compete with quality of rental accommodation available in Waterloo. | Approval for new student accommodation pending. | Director, Stratford School Administrative Officer Dean of Arts | In progress - fall 2025 |

| | | | | |
|-----|---|--|--|--------------------|
| 15. | For the MDEI candidates, we suggest establishing some course work and formal networking opportunities in Toronto. | <ul style="list-style-type: none"> Develop online MDEI | Director, Stratford School Curriculum committee Administrative Officer | Complete - 2021-22 |
| 16. | Consider development of a research masters and PhD to enrich the curriculum and extend the reach of the program. | Changing the on-campus MDEI program to a hybrid delivery model would also allow us to create space for a research Master's and PhD program | Director, Stratford School, Curriculum committee | In progress - 2024 |

The Department Chair/Director, in consultation with the Dean of the Faculty shall be responsible for monitoring the Implementation Plan.

Date of next program review: _____ 2025-26
Date

Signatures of Approval:



March 30, 2022

Chair/Director _____ Date

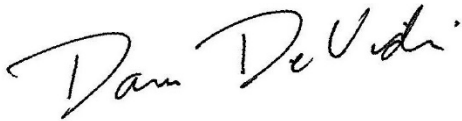
AFIW Administrative Dean/Head (For AFIW programs only) _____ Date



6 September 2023

Faculty Dean _____ Date

Note: AFIW programs fall under the Faculty of ARTS; however, the Dean does not have fiscal control nor authority over staffing and administration of the program.



October 21, 2022

Associate Vice-President, Academic _____ Date
(For undergraduate and augmented programs)



October 21, 2022

Associate Vice-President, Graduate Studies and Postdoctoral Affairs _____ Date

(For graduate and augmented programs)



**Senate Undergraduate Council
Curriculum Subcommittee**

For Approval

Open Session

To: **Senate Undergraduate Committee**

Sponsor: David DeVidi, Associate Vice-President, Academic
Contact Information: david.devidi@uwaterloo.ca

Presenter: David DeVidi, Associate Vice-President, Academic
Contact Information: david.devidi@uwaterloo.ca

Date of Meeting: **November 21, 2023**

Agenda Item Identification: **Approval of Major Modifications and Regulation Changes**

Recommendation/Motion:

To recommend Senate approve the following major program modifications and regulation changes, as presented.

Summary:

The SUC Curriculum met on November 15, 2023 to review and discuss curricular submissions, and agreed to forward the following items, included in the appendices of this report, to SUC as part of the regular agenda. These items include major program modifications and regulation changes from the Faculty of Engineering and the Faculty of Environment.

Due to time, the inactivate the Global Experience Certificate (GEC) from the Student Success Office had not been reviewed or put to a vote to recommend to SUC. It is still included for SUC approval to recommend to Senate as part of this report.

Documents Included:

- Appendix A: Faculty of Engineering
- Appendix B: Faculty of Environment
- Appendix C: Student Success Office

4.6 Computer Engineering [for approval]

~~1 - Minor Plan Changes~~

- ~~a) Update ethics requirement~~
- ~~b) Update Natural Science Elective list~~

Secretary Note: Minor Plan Changes and Course Changes for consideration as part of the consent agenda.

~~2 - Major Plan Changes~~

- ~~a) Create a Quantum Engineering Specialization~~

~~3 - Course Changes~~

- ~~a) Inactivating courses (ECE 103, 155, 204A, 242, 254, 361, 405)~~
- ~~b) Updating course prerequisites (ECE 124, 203, 222, 224, 252, 320, 327, 350, 351, 356, 406, 409, 414, 423, 451, 452, 453, 454, 455, 457A, 457B, 458, 459, 498A)~~
- ~~c) Create new courses (ECE 305, ECE 405A, ECE 405B, ECE 405C, ECE 405D)~~

Background & Rationale:

~~1a) Currently, students must choose an ethics requirement course from a list of courses as part of their PD (PD22) or take PHIL 315, which is only offered in Winter terms. By offering PHIL 215 (offered every term either on campus or online), and PHIL 219J, will provide students with more flexibility and choice to complete this requirement.~~

~~1b) Updating the Natural Science Elective list to include the removal of CHEM 404 as students no longer meet the requirements due to prerequisite changes; removal of ECE 405 as it is being inactivated and adding ECE 305 (new course).~~

~~2a) Creating a Quantum Engineering Specialization to meet the growing demand for education and training in this new and growing area. ECE Undergraduate Studies Committee held February 8, 2023. Department meeting held February 16, 2023. Students active in the program when the new specialization is introduced can declare the specialization.~~

~~3a) Inactivating courses that have not been taught in over 5 years with no plans for future teachings. (ECE 103, ECE 155, ECE 204A, ECE 242, ECE 254 & ECE 361). Inactivating ECE 405 as it is being replaced with a new course ECE 305.~~

~~3b) Updating ECE 203 prerequisite due to the inactivation of ECE 103. Updating ECE 489A prerequisite to be accurate due to the inactivation of ECE 390 previously and not currently reflective of the previous change. ECE 414 prerequisite also being updated to be accurate due to previous change of ECE 307 replacing ECE 306. With the recent approval of courses being added to the Computing Option, Computer Engineering Option and Software Engineering Option lists, the demand for specific ECE courses has increased; therefore, updating these ECE course prerequisites will reduce administrative burden as well as make it easier for students to add these courses. (ECE 124, 222, 224, 252, 320, 327, 350, 351, 356, 406, 409, 423, 451, 452, 453, 454, 455, 457A, 457B, 458, and 459).~~

~~3c) Creating new courses required for the Quantum Engineering Specialization. (ECE 305, ECE 405A, ECE 405B, ECE 405C, ECE 405D)~~

.....

Complementary Studies Electives

Students must complete three complementary studies electives (CSEs) from the [Complementary Studies Course Lists for Engineering](#). These are in addition to those courses that are part of the core curriculum and contain complementary studies material, such as [COMMST 192/ENGL 192](#), [ECE 190](#), [ECE 192](#), and the Professional Development (PD) sequence. The three CSE courses are to be chosen according to the following constraints:

- Two courses from List C
- One course from any of List A, List C, or List D

Ethics Requirement

~~To meet the Ethics Requirement, students must pass one of [PD 22](#) or [PHIL 315](#). [PHIL 315](#) satisfies both the ethics requirement and one of the List C CSE requirements described above.~~

Students can complete the Ethics requirement by either completing one course from the following list (can also count as a List C CSE):

- [PHIL 215/ARBUS 202 Professional and Business Ethics](#)
- [PHIL 219J Practical Ethics](#)
- [PHIL 315 Ethics and The Engineering Profession](#)

Or by completing [PD 22 Professionalism and Ethics in Engineering Practice](#) (can be taken as a PD elective).

Natural Science Electives

Students are required to complete two natural science electives (NSEs) ~~and are responsible for ensuring they meet the minimum academic units~~. The two NSE courses must be primarily concerned with natural science and are in addition to the science components of the core curriculum, such as [ECE 105](#), [ECE 106](#), and [ECE 109](#).

- [BIOL 110](#) Biodiversity, Biomes, and Evolution
- [BIOL 130](#) Introductory Cell Biology and [BIOL 130L](#) Cell Biology Laboratory
- [BIOL 150](#) Organismal and Evolutionary Ecology
- [BIOL 165](#) Diversity of Life
- [BIOL 220](#) Introduction to Plant Structure and Function
- [BIOL 211](#) Introductory Vertebrate Zoology
- [BIOL 239](#) Genetics
- [BIOL 240](#) Fundamentals of Microbiology and [BIOL 240L](#) Microbiology Laboratory
- [BIOL 241](#) Introduction to Applied Microbiology
- [BIOL 273](#) Principles of Human Physiology 1
- [BIOL 373](#) Principles of Human Physiology 2 and [BIOL 373L](#) Human Physiology Laboratory
- [CHE 102](#) Chemistry for Engineers
- [CHE 161](#) Engineering Biology
- [CHEM 123](#) General Chemistry 2 and [CHEM 123L](#) General Chemistry Laboratory 2
- [CHEM 209](#) Introductory Spectroscopy and Structure

- [CHEM 237](#) Introductory Biochemistry, and [CHEM 237L](#) Introductory Biochemistry Laboratory
- [CHEM 254](#) Introductory Chemical Thermodynamics
- [CHEM 262](#) Organic Chemistry for Engineering and [CHEM 262L](#) Organic Chemistry Laboratory for Engineering Students
- [CHEM 266](#) Basic Organic Chemistry 1
- [CHEM 356](#) Introductory Quantum Mechanics
- ~~[CHEM 404](#) Physiochemical Aspects of Natural Waters~~
- [EARTH 121](#) Introductory Earth Sciences
- [EARTH 122](#) Introductory Environmental Sciences
- [EARTH 123](#) Introductory Hydrology
- [EARTH 221](#) Introductory Geochemistry
- [EARTH 270](#) Disasters and Natural Hazards
- [EARTH 281](#) Geological Impacts on Human Health
- [ECE 231](#) Semiconductor Physics and Devices
- [ECE 305 Introduction to Quantum Mechanics](#)
- [ECE 403](#) Thermal Physics
- [ECE 404](#) Geometrical and Physical Optics
- ~~[ECE 405](#) Introduction to Quantum Mechanics~~
- [ENVE 275](#) Environmental Chemistry
- [ENVS 200](#) Field Ecology
- [NE 222](#) Organic Chemistry for Nanotechnology Engineers
- [PHYS 124](#) Modern Physics
- [PHYS 233](#) Introduction to Quantum Mechanics
- [PHYS 234](#) Quantum Physics 1
- [PHYS 263](#) Classical Mechanics and Special Relativity
- [PHYS 275](#) Planets
- [PHYS 280/BIOL 280](#) Introduction to Biophysics
- [PHYS 334](#) Quantum Physics 2
- [PHYS 335](#) Condensed Matter Physics
- [PHYS 375](#) Stars
- [PHYS 380](#) Molecular and Cellular Biophysics
- [PSYCH 207](#) Cognitive Processes
- [PSYCH 261](#) Physiological Psychology
- [PSYCH 306](#) Perception
- [SCI 238](#) Introductory Astronomy
- [SCI 250](#) Environmental Geology

Technical Electives

Students are required to complete a total of eight technical electives (TEs), subject to the following conditions:

- All of the technical courses from the 3B term (i.e., [ECE 313](#), [ECE 320](#), [ECE 331](#), [ECE 351](#), [ECE 356](#), [ECE 358](#), [ECE 360](#), and [ECE 373](#)) count as TEs. At least three of these courses must be taken in the 3B term, as specified in the curriculum above.
- At least three TEs must be courses chosen from [ECE 406](#) through [ECE 495](#) or [ECE 499](#), normally taken during the 4A and 4B terms. A list of current 4A and 4B TEs is provided below.
- At least one TE, to a maximum of two, must be from another engineering (other than Electrical or Computer Engineering) plan; such courses must have sufficiently advanced engineering science or engineering design content to be allowed, and must be approved by the ECE Undergraduate Office. Some courses of interest may require prerequisite knowledge that is not part of the core curriculum in Computer Engineering. Students may require extra courses or may need to seek enrolment approval from the course instructor if the prerequisite knowledge was acquired by other means.

- The following courses are offered in the core curriculum in Electrical Engineering but are considered TE courses for Computer Engineering: [ECE 260](#), [ECE 340](#), and [ECE 375](#). Some of these courses have prerequisites that must be met in order to enrol.
- In all terms, elective availability is subject to scheduling constraints.

The following TE courses are normally offered for the spring (4A) term. The list is subject to change from year to year.

- [ECE 414](#) Wireless Communications
- [ECE 433](#) Fabrication Technologies for Micro and Nano Devices
- [ECE 445](#) Integrated Digital Electronics
- [ECE 452/CS 446](#) Software Design and Architectures
- [ECE 454](#) Distributed Computing
- [ECE 455](#) Embedded Software
- [ECE 457A](#) Co-operative and Adaptive Algorithms
- [ECE 457C](#) Reinforcement Learning
- [ECE 458](#) Computer Security
- [ECE 462](#) Electrical Distribution Systems
- [ECE 463](#) Design and Applications of Power Electronic Converters
- [ECE 475](#) Radio-Wave Systems
- [ECE 481](#) Digital Control Systems
- [ECE 486](#) Robot Dynamics and Control
- [ECE 493](#) Special Topics in Electrical and Computer Engineering (see Note 3)

The following TE courses are normally offered for the winter (4B) term. The list is subject to change from year to year.

- [ECE 406](#) Algorithm Design and Analysis
- [ECE 409](#) Cryptography and System Security
- [ECE 416](#) Advanced Topics in Networking
- [ECE 417](#) Image Processing
- [ECE 423](#) Embedded Computer Systems
- [ECE 432](#) Radio Frequency Integrated Devices and Circuits
- [ECE 444](#) Integrated Analog Electronics
- [ECE 451/CS 445](#) Software Requirements Specification and Analysis
- [ECE 453/CS 447](#) Software Testing, Quality Assurance, and Maintenance
- [ECE 457B](#) Fundamentals of Computational Intelligence
- [ECE 459](#) Programming for Performance
- [ECE 464](#) High Voltage Engineering and Power System Protection
- [ECE 467](#) Power Systems Analysis, Operations, and Markets
- [ECE 474](#) Radio and Wireless Systems
- [ECE 477](#) Photonic Devices and Systems
- [ECE 488](#) Multivariable Control Systems
- [ECE 493](#) Special Topics in Electrical and Computer Engineering (see Note 3)
- [ECE 495](#) Autonomous Vehicle

The following project elective is offered every term. Students may take it, at most, once as a TE course.

- [ECE 499](#) Engineering Project

Communications and Signal Processing Specialization

Students interested in pursuing this Specialization must achieve a minimum average of 60% in the specialization courses, and a minimum grade of 50% in each of the courses. Students who satisfy the requirements for Faculty [Options, Specializations and Electives for](#)

Engineering Students will have the appropriate designation shown on their diploma and transcript.

Required courses:

- [ECE 313](#) Digital Signal Processing
- [ECE 318](#) Communication Systems

Any three courses from the following list:

- [ECE 358](#) Computer Networks
- [ECE 414](#) Wireless Communications
- [ECE 416](#) Advanced Topics in Networking
- [ECE 417](#) Image Processing
- [ECE 474](#) Radio and Wireless Systems

Quantum Engineering Specialization

Student interested in pursuing this Specialization must achieve a minimum average of 60% in the specialization courses, and a minimum grade of 50% in each of the courses. Students who satisfy the requirements for Faculty Options, Specializations and Electives for Engineering Students will have the appropriate designation shown on their diploma and transcript.

Students need to complete:

- **ECE 305 Introduction to Quantum Mechanics**

plus 3 courses from the list below:

- **ECE 405A Quantum Info Processing Devices**
- **ECE 405B Experimental Quantum Engineering**
- **ECE 405C Quantum Computing**
- **ECE 405D Superconducting Quantum Circuits**

4.7 Electrical Engineering [for approval]

~~1 - Minor Plan Changes~~

- ~~a) Update ethics requirement~~
- ~~b) Update Natural Science Elective list~~

Secretary Note: Minor Plan Changes and Course Changes for consideration as part of the consent agenda.

~~2 - Major Plan Changes~~

- ~~a) Create a Quantum Engineering Specialization~~

~~3 - Course Changes~~

- ~~a) Inactivating courses (ECE 103, 155, 204A, 242, 254, 361, 405)~~
- ~~b) Updating course prerequisites (ECE 124, 203, 222, 224, 252, 320, 327, 350, 351, 356, 406, 409, 414, 423, 451, 452, 453, 454, 455, 457A, 457B, 458, 459, 498A)~~
- ~~c) Create new courses (ECE 305, ECE 405A, ECE 405B, ECE 405C, ECE 405D)~~

Background & Rationale:

~~1a) Currently, students must choose an ethics requirement course from a list of courses as part of their PD (PD22) or take PHIL 315, which is only offered in Winter terms. By offering PHIL 215 (offered every term either on campus or online), and PHIL 219J, will provide students with more flexibility and choice to complete this requirement.~~

~~1b) Updating the Natural Science Elective list to include the removal of CHEM 404 as students no longer meet the requirements due to prerequisite changes; removal of ECE 405 as it is being inactivated and adding ECE 305 (new course).~~

2a) Creating a Quantum Engineering Specialization to meet the growing demand for education and training in this new and growing area. ECE Undergraduate Studies Committee held February 8, 2023. Department meeting held February 16, 2023. Students active in the program when the new specialization is introduced can declare the specialization.

~~3a) Inactivating courses that have not been taught in over 5 years with no plans for future teachings. (ECE 103, ECE 155, ECE 204A, ECE 242, ECE 254 & ECE 361). Inactivating ECE 405 as it is being replaced with a new course ECE 305.~~

~~3b) Updating ECE 203 prerequisite due to the inactivation of ECE 103. Updating ECE 489A prerequisite to be accurate due to the inactivation of ECE 390 previously and not currently reflective of the previous change. ECE 414 prerequisite also being updated to be accurate due to previous change of ECE 307 replacing ECE 306. With the recent approval of courses being added to the Computing Option, Computer Engineering Option and Software Engineering Option lists, the demand for specific ECE courses has increased; therefore, updating these ECE course prerequisites will reduce administrative burden as well as make it easier for students to add these courses. (ECE 124, 222, 224, 252, 320, 327, 350, 351, 356, 406, 409, 423, 451, 452, 453, 454, 455, 457A, 457B, 458, and 459).~~

~~3c) Creating new courses required for the Quantum Engineering Specialization. (ECE 305, ECE 405A, ECE 405B, ECE 405C, ECE 405D)~~

.....

Complementary Studies Electives

Students must complete three complementary studies electives (CSEs) from the [Complementary Studies Course Lists for Engineering](#). These are in addition to those courses that are part of the core curriculum and contain complementary studies material, such as [COMMST 192/ENGL 192](#), [ECE 190](#), [ECE 192](#), and the Professional Development (PD) sequence. The three CSE courses are to be chosen according to the following constraint:

- Two courses from List C
- One course from any of List A, List C, or List D

Ethics Requirement

~~To meet the Ethics Requirement, students must pass one of [PD 22](#) or [PHIL 315](#). PHIL 315 satisfies both the ethics requirement and one of the List C CSE requirements described above.~~

Students can complete the Ethics requirement by either completing one course from the following list (can also count as a List C CSE):

- [PHIL 215/ARBUS 202 Professional and Business Ethics](#)
- [PHIL 219J Practical Ethics](#)
- [PHIL 315 Ethics and The Engineering Profession](#)

Or by completing [PD 22 Professionalism and Ethics in Engineering Practice](#) (can be taken as a PD elective).

Natural Science Electives

Students are required to complete two natural science electives (NSEs) ~~and are responsible for ensuring they meet the minimum academic units~~. The two NSE courses must be primarily concerned with natural science and are in addition to the science components of the core curriculum, such as [ECE 105](#), [ECE 106](#), [ECE 109](#), and [ECE 231](#).

- [BIOL 110](#) Biodiversity, Biomes, and Evolution
- [BIOL 130](#) Introductory Cell Biology and [BIOL 130L](#) Cell Biology Laboratory
- [BIOL 150](#) Organismal and Evolutionary Ecology
- [BIOL 165](#) Diversity of Life
- [BIOL 211](#) Introductory Vertebrate Zoology
- [BIOL 220](#) Introduction to Plant Structure and Function
- [BIOL 239](#) Genetics
- [BIOL 240](#) Fundamentals of Microbiology and [BIOL 240L](#) Microbiology Laboratory
- [BIOL 241](#) Introduction to Applied Microbiology
- [BIOL 273](#) Principles of Human Physiology 1
- [BIOL 373](#) Principles of Human Physiology 2 and [BIOL 373L](#) Human Physiology Laboratory
- [CHE 102](#) Chemistry for Engineers
- [CHE 161](#) Engineering Biology
- [CHEM 123](#) General Chemistry 2 and [CHEM 123L](#) General Chemistry Laboratory 2
- [CHEM 209](#) Introductory Spectroscopy and Structure

- [CHEM 237](#) Introductory Biochemistry and [CHEM 237L](#) Introductory Biochemistry Laboratory
- [CHEM 254](#) Introductory Chemical Thermodynamics
- [CHEM 262](#) Organic Chemistry for Engineering and [CHEM 262L](#) Organic Chemistry Laboratory for Engineering Students
- [CHEM 266](#) Basic Organic Chemistry 1
- [CHEM 356](#) Introductory Quantum Mechanics
- ~~[CHEM 404](#) [Physiochemical Aspects of Natural Waters](#)~~
- [EARTH 121](#) Introductory Earth Sciences
- [EARTH 122](#) Introductory Environmental Sciences
- [EARTH 123](#) Introductory Hydrology
- [EARTH 221](#) Introductory Geochemistry
- [EARTH 270](#) Disasters and Natural Hazards
- [EARTH 281](#) Geological Impacts on Human Health
- [ECE 305](#) [Introduction to Quantum Mechanics](#)
- [ECE 403](#) Thermal Physics
- [ECE 404](#) Geometrical and Physical Optics
- ~~[ECE 405](#) [Introduction to Quantum Mechanics](#)~~
- [ENVE 275](#) Environmental Chemistry
- [ENVS 200](#) Field Ecology
- [NE 222](#) Organic Chemistry for Nanotechnology Engineers
- [PHYS 124](#) Modern Physics
- [PHYS 233](#) Introduction to Quantum Mechanics
- [PHYS 234](#) Quantum Physics 1
- [PHYS 263](#) Classical Mechanics and Special Relativity
- [PHYS 275](#) Planets
- [PHYS 280](#)/[BIOL 280](#) Introduction to Biophysics
- [PHYS 334](#) Quantum Physics 2
- [PHYS 335](#) Condensed Matter Physics
- [PHYS 375](#) Stars
- [PHYS 380](#) Molecular and Cellular Biophysics
- [PSYCH 207](#) Cognitive Processes
- [PSYCH 261](#) Physiological Psychology
- [PSYCH 306](#) Perception
- [SCI 238](#) Introductory Astronomy
- [SCI 250](#) Environmental Geology

Technical Electives

Students are required to complete a total of eight technical electives (TEs), subject to the following conditions:

- All of the technical courses from the 3B term (i.e., [ECE 313](#), [ECE 320](#), [ECE 331](#), [ECE 351](#), [ECE 356](#), [ECE 358](#), [ECE 360](#), and [ECE 373](#)) count as TEs. At least three of these courses must be taken in the 3B term, as specified in the curriculum table above.
- At least three TEs must be courses chosen from [ECE 406](#) through [ECE 495](#) or [ECE 499](#), normally taken during the 4A and 4B terms. A list of current 4A and 4B TEs is provided below.
- At least one TE, to a maximum of two, must be from another engineering (other than Electrical or Computer Engineering) plan; such courses must have sufficiently advanced engineering science or engineering design content to be allowed, and must be approved by the ECE Undergraduate Office. Some courses of interest may require prerequisite knowledge that is not part of the core curriculum in Electrical Engineering. Students may require extra courses or may need to seek enrolment approval from the course instructor if the prerequisite knowledge was acquired by other means.
- The following courses are offered in the core curriculum in Computer Engineering but are considered TE courses for Electrical Engineering: [ECE 224](#), [ECE 252](#), [ECE 327](#),

and [ECE 350](#). Some of these courses have prerequisites that must be met in order to enrol.

- In all terms, elective availability is subject to scheduling constraints.

The following TE courses are normally offered for the spring (4A) term. The list is subject to change from year to year.

- [ECE 414](#) Wireless Communications
- [ECE 433](#) Fabrication Technologies for Micro and Nano Devices
- [ECE 445](#) Integrated Digital Electronics
- [ECE 452/CS 446](#) Software Design and Architectures
- [ECE 454](#) Distributed Computing
- [ECE 455](#) Embedded Software
- [ECE 457A](#) Co-operative and Adaptive Algorithms
- [ECE 457C](#) Reinforcement Learning
- [ECE 458](#) Computer Security
- [ECE 462](#) Electrical Distribution Systems
- [ECE 463](#) Design and Applications of Power Electronic Converters
- [ECE 475](#) Radio-Wave Systems
- [ECE 481](#) Digital Control Systems
- [ECE 486](#) Robot Dynamics and Control
- [ECE 493](#) Special Topics in Electrical and Computer Engineering (see Note 3)

The following TE courses are normally offered for the winter (4B) term. The list is subject to change from year to year.

- [ECE 406](#) Algorithm Design and Analysis
- [ECE 409](#) Cryptography and System Security
- [ECE 416](#) Advanced Topics in Networking
- [ECE 417](#) Image Processing
- [ECE 423](#) Embedded Computer Systems
- [ECE 432](#) Radio Frequency Integrated Devices and Circuits
- [ECE 444](#) Integrated Analog Electronics
- [ECE 451/CS 445](#) Software Requirements Specification and Analysis
- [ECE 453/CS 447](#) Software Testing, Quality Assurance and Maintenance
- [ECE 457B](#) Fundamentals of Computational Intelligence
- [ECE 459](#) Programming for Performance
- [ECE 464](#) High Voltage Engineering and Power System Protection
- [ECE 467](#) Power Systems Analysis, Operations and Markets
- [ECE 474](#) Radio and Wireless Systems
- [ECE 477](#) Photonic Devices and Systems
- [ECE 488](#) Multivariable Control Systems
- [ECE 493](#) Special Topics in Electrical and Computer Engineering (see Note 3)
- [ECE 495](#) Autonomous Vehicle

The following project elective is offered every term. Students may take it, at most, once as a TE course.

- [ECE 499](#) Engineering Project

Communications and Signal Processing Specialization

Students interested in pursuing this Specialization must achieve a minimum average of 60% in the specialization courses, and a minimum grade of 50% in each of the courses. Students who satisfy the requirements for Faculty [Options, Specializations and Electives for Engineering Students](#) will have the appropriate designation shown on their diploma and

transcript.

Required courses:

- [ECE 313](#) Digital Signal Processing
- [ECE 318](#) Communication Systems

Any three courses from the following list:

- [ECE 358](#) Computer Networks
- [ECE 414](#) Wireless Communications
- [ECE 416](#) Advanced Topics in Networking
- [ECE 417](#) Image Processing
- [ECE 474](#) Radio and Wireless Systems

Quantum Engineering Specialization

Student interested in pursuing this Specialization must achieve a minimum average of 60% in the specialization courses, and a minimum grade of 50% in each of the courses. Students who satisfy the requirements for Faculty Options, Specializations and Electives for Engineering Students will have the appropriate designation shown on their diploma and transcript.

Students need to complete:

- **ECE 305 Introduction to Quantum Mechanics**

plus 3 courses from the list below:

- **ECE 405A Quantum Info Processing Devices**
- **ECE 405B Experimental Quantum Engineering**
- **ECE 405C Quantum Computing**
- **ECE 405D Superconducting Quantum Circuits**

4.13 Nanotechnology Engineering [for approval]

Summary:

1. Minor Modifications

a) ~~Update Technical Elective lists~~

2. Major Modifications

a) Create 4 specializations

3. Course Changes

a) ~~Separate the laboratory of NE281 and create stand-alone laboratory course NE380L~~

b) ~~Update prerequisites (NE 481)~~

Secretary Note: Minor Modifications and Course Changes for consideration as part of the consent agenda.

Background & Rationale:

~~1a) Adding courses to the Technical Elective lists to provide students more variety and flexibility.~~

2a) The inherent nature of the program is seen by the choice of highly focused senior laboratory choices available to students. Adding these specializations will help students who are interested in focusing their studies, be able to better communicate their strengths in a particular area of nanotechnology engineering. For each specialization there are two lists. List A courses capture fundamental electives in that area of expertise, and list B courses provide an opportunity for student to further specialize. Nanotechnology Engineering students are required to choose 8 technical electives, 4 of which must be NE designated courses. In order to satisfy the requirement for a specialization, students will need to complete the designated NE454 and NE455 laboratories, choose 2 courses from List A of a specialization, and choose another 3 courses from either List A or List B. Students active in the program when the new specializations are introduced can declare the specializations.

~~3a) The formation of the new nanobiotechnology lab, NE 380L, addresses a gap in the nanotechnology engineering program, as this lab falls into the nanobiosystems area of focus, which is the last of the four areas of focus in the NE program to receive its dedicated core laboratory (other focus areas include nanoelectronics, nanomaterials, nanoinstrumentation). Currently, this laboratory activity is associated to the course Biology of nanotechnology engineers (NE 281), offered in the 2B term. By moving this to a later term (3A), and changing the focus from biology to nanobiology, this will balance student workload and will provide students with the training of laboratory skills where nanotechnology principles of design and synthesis of active particles and surfaces are applied to biological problems. The lab content will build upon the nanomaterial synthesis and characterization laboratories and lectures of the previous term. NE 380L will be scheduled for 3.0 hrs every other week. The prerequisite restriction to Nanotechnology Engineering is removed from the lab to provide opportunities for students from outside NE. Capacity restrictions will ensure there is space for all NE students.~~

Impact:

- ~~○ The total number of course credits for the program will increase by 0.25; the 2B term will remain at 2.75CR, the 3A term will increase to 3.0CR~~
- ~~○ The program workload will not change, but the term workloads will be more balanced: Decrease in 2B workload from 20.25 AUs (25.5 hrs/wk) to 19.5 AUs (24 hrs/wk). Increase in 3A workload from 17.75 AUs (20.5 hrs/wk) to 18.5 AUs (22 hrs/wk)~~
- ~~○ The change will not impact instructor schedule~~

- ~~The change will impact lab schedules with 3A labs scheduled in the mornings, and space is available to accommodate these labs.~~

~~3b) Updating prerequisites to be in-line with newly created CHE 560 to be cross-listed with NE 481 for accuracy.~~

Nanotechnology Engineering

MARK UP

•••

Technical Electives

The Nanotechnology Engineering plan may be divided broadly into four areas of concentration, identified herein as micro and nano-instrumentation, nano-electronics, nanobiosystems, and nanomaterials. A set of eight technical elective course choices is provided in the curriculum to enable students to focus upon at least two of these areas of concentration. Students may choose up to four courses from outside the Nanotechnology Engineering plan to complement their studies. Approved technical electives are listed below. For a list of courses available in a specific term, consult the nanotechnology engineering undergraduate co-ordinator. The associate director (program) has the right, where the number of students enrolled in a course at the end of the Course Selection Period is 10 or less, to cancel the course.

Note: For **NE 453**, more than one course may be offered simultaneously under this course number.

- **NE 335** Soft Nanomaterials
- **NE 344** Electronic Circuits
- **NE 345** Photonic Materials and Devices
- **NE 353** Nanoprobng and Lithography
- **NE 381** Introduction to Nanoscale Biosystems
- **NE 451** Simulation Methods
- **NE 452** Special Topics in Nanoscale Simulations
- **NE 453** Special Topics in Nanotechnology Engineering
- **NE 459** Nanotechnology Engineering Research Project
- **NE 461** Micro and Nano-instrumentation
- **NE 466** Tactile Sensors and Transducers
- **NE 471** Nano-electronics
- **NE 476** Organic Electronics
- **NE 481** Nanomedicine and Nanobiotechnology
- **NE 486** Biosensors
- **NE 487** Microfluidic and Nanobiotechnological Systems
- **NE 488/CHE 561** Biomaterials and Biomedical Design
- **NE 491** Nanostructured Materials
- **NE 496** Nanomaterials for Electrochemical Energy Systems

Students may choose up to a maximum of four non-NE technical elective courses from the lists below.

List 1 —~~200-level~~

Maximum of one technical elective from the following list.

- **AMATH 456 Calculus of Variations**
- **BIOL 240 Fundamentals of Microbiology**

- CHE 225/CHE 425 Strategies for Process Improvement and Product Development
- CIVE 204 Solid Mechanics 1
- CIVE 230 Engineering and Sustainable Development
- CO 487 Applied Cryptography
- ECE 222 Digital Computers
- ECE 224 Embedded Microprocessor Systems
- ECE 250 Algorithms and Data Structures
- ECE 252 Systems Programming and Concurrency
- ECE 254 Operating Systems and Systems Programming
- ECE 260 Electromechanical Energy Conversion
- ECON 371 Business Finance 1
- KIN 255 Fundamentals of Neuroscience
- KIN 340 Musculoskeletal Injury in sport and Activity
- ME 262 Introduction to Microprocessors and Digital Logic
- MSCI 240 Algorithms and Data Structures
- MSCI 245 Databases and Software Design
- MTE 241 Introduction to Computer Structures and Real-Time Systems
- MTE 262 Introduction to Microprocessors and Digital Logic
- STAT 341 Computational Statistics and Data Analysis
- SYDE 223 Data Structures and Algorithms

List 2 —~~Non~~—NE

- BME 384 Biomedical Transport: Biofluids and Mass Transfer
- BME 386 The Physics of Medical Imaging
- BME 393 Digital Systems
- BME 550 Sports Engineering
- BME 587 Special Topics in Biomedical Signals
- CHE 314 Chemical Reaction Engineering
- CHE 331 Electrochemical Engineering
- CHE 361 Bioprocess Engineering
- CHE 480 Process Analysis and Design
- CHE 514 Fundamentals of Petroleum Production
- CHE 516 Energy Systems Engineering
- CHE 521 Process Optimization
- CHE 543 Polymer Production: Polymer Reaction Engineering
- CHE 562 Advanced Bioprocess Engineering
- CHE 571 Industrial Ecology
- CHE 572 Air Pollution Control
- CHE 574 Industrial Wastewater Pollution Control
- CIVE 310 Introduction to Structural Design
- CIVE 460/ME 574 Engineering Biomechanics
- CIVE 512 Rehabilitation of Structures
- ECE 327 Digital Hardware Systems
- ECE 340 Electronic Circuits 2
- ECE 350 Real-Time Operating Systems
- ECE 356 Database Systems
- ECE 358 Computer Networks
- ECE 360 Power Systems and Smart Grids
- ECE 373 Radio Frequency and Microwave Circuits
- ECE 375 Electromagnetic Fields and Waves
- ECE 406 Algorithm Design and Analysis
- ECE 409 Cryptography and System Security
- ECE 416 Advanced Topics in Networking
- ECE 417 Image Processing
- ECE 423 Embedded Computer Systems
- ECE 432 Radio Frequency Integrated Devices and Circuits
- ECE 444 Integrated Analog Electronics

- [ECE 451 Software Requirements Specification and Analysis](#)
- [ECE 452 Software Design and Architectures](#)
- ECE 457A Co-operative and Adaptive Algorithms
- ECE 457B Fundamentals of Computational Intelligence
- ECE 459 Programming for Performance
- ECE 474 Radio and Wireless Systems
- ECE 477 Photonic Devices and Systems
- ECE 484 Digital Control Applications
- ECE 488 Multivariable Control Systems
- ME 340 Manufacturing Processes
- ME 435 Industrial Metallurgy
- ME 459 Energy Conversion
- ME 526 Fatigue and Fracture Analysis
- ME 531 Physical Metallurgy Applied to Manufacturing
- ME 533 Non-metallic and Composite Materials
- [ME 574 Engineering Biomechanics](#)
- [ME 596 Special topics in Mechanical Engineering \(Topic: Introduction to Fabrication and Characterization of Nanostructures\)](#)
- MSCI 331 Introduction to Optimization
- MSCI 332 Deterministic Optimization Models and Methods
- [MSCI 333 Simulation Analysis and Design](#)
- MSCI 342 Principles of Software Engineering
- MSCI 343 Human-Computer Interaction
- MSCI 431 Stochastic Models and Methods
- MSCI 432 Production and Service Operations Management
- MSCI 435 Advanced Optimization Techniques
- MSCI 446 Introduction to Machine Learning
- MSCI 452 Decision Making Under Uncertainty
- MTE 322 Electromechanical Machine Design
- MTE 325 Microprocessor Systems and Interfacing for Mechatronics Engineering
- MTE 360 Automatic Control Systems
- MTE 420 Power Electronics and Motor Drives
- MTE 544 Autonomous Mobile Robots
- MTE 545 Introduction to MEMS Fabrication
- SE 464 Software Design and Architectures
- SYDE 322 Software Design
- SYDE 334 Applied Statistics
- SYDE 522 Foundations of Artificial Intelligence
- SYDE 531 Design Optimization Under Probabilistic Uncertainty
- SYDE 533 Conflict Resolution
- SYDE 542 Interface Design
- SYDE 543 Cognitive Ergonomics
- [SYDE BME 544 Biomedical Measurement and Signal Processing](#)
- SYDE 548 User Centred Design Methods
- SYDE 552/BIOL 487 Computational Neuroscience
- SYDE 556 Simulating Neurobiological Systems
- SYDE 572 Introduction to Pattern Recognition
- [SYDE 575 Image Processing](#)
- SYDE 584 Physiological Systems and Biomedical Design

[Specializations](#)

[The Faculty of Engineering recognizes four specializations with the Nanotechnology Engineering BAsC degree. Students who satisfy the specialization requirements \(courses and grades\) will have the specialization designation shown on their transcript and diploma. Specializations are intended to recognize success in a concentration of electives within the Nanotechnology Engineering degree](#)

specification, where specializations focus the selection of technical electives and do not require extra courses.

Each specialization requires students to select technical electives with a common theme. Students are responsible for meeting the TE requirements of the Nanotechnology Engineering degree when pursuing a specialization. Students must declare a specialization for it to be recognized as part of their degree and appear on the transcript and diploma. To obtain a specialization, students will need to complete the two required laboratories, 2 courses from List A, and another 3 courses from either List A or List B for that specialization.

The specialization course requirements are provided below.

Nanoelectronics Specialization

The nanoelectronics specialization requires:

2 Laboratories:

NE 454A Nano-electronics Laboratory 1

NE 455A Nano-electronics Laboratory 2

List A Technical Electives:

NE 344 Electronic Circuits

NE 345 Photonic Materials and Devices

NE 471 Nano-electronics

NE 476 Organic Electronics

List B Technical Electives:

NE 459 Nanotechnology Engineering Research Project*

NE 466 Tactile Sensors and Transducers

NE 496 Nanomaterials for Electrochemical Energy Systems

ECE 331 Electronic Devices

ECE 432 Radio Frequency Integrated Devices and Circuits

ECE 444 Integrated Analog Electronics

*With approval from the Associate Director (students)

Nanobiosystems Specialization

The Nanobiosystems Specialization requires:

2 Laboratories:

NE 454C Nanobiosystems Laboratory 1

NE 455C Nanobiosystems Laboratory 2

List A Technical Electives:

NE 335 Soft Nanomaterials

NE 381 Introduction to Nanoscale Biosystems

NE 481 Nanomedicine and Nanobiotechnology

NE 486 Biosensors

List B Technical Electives:

NE 459 Nanotechnology Engineering Research Project*

NE 487 Microfluidic and Nanobiotechnological Systems

NE 488 Biomaterials and Biomedical Design

CHE 562 Advanced Bioprocess Engineering

CHE 565 Synthetic Biology Project Design

CIVE 460/ME 574 Engineering Biomechanics

SYDE 544 Biomedical Measurement and Signal Processing
***With approval from the Associate Director (students)**

Nanofabrication Specialization

The Nanofabrication Specialization requires:

2 Laboratories:

NE 454B Nano-instrumentation Laboratory 1

NE 455B Nano- instrumentation Laboratory 1

List A Technical Electives:

NE 345 Photonic Materials and Devices

NE 353 Nanoprobing and Lithography

NE 461 Micro and Nano-instrumentation

List B Technical Electives:

NE 459 Nanotechnology Engineering Research Project*

MTE 545 Introduction to MEMS fabrication

ME 596 Special topics in mechanical engineering;

Intro. Fabrication and Characterization of Nanostructures

***With approval from the Associate Director (students)**

Nanomaterials Specialization

The Nanomaterials Specialization requires:

2 Laboratories:

NE 454D Nanostructured Materials Laboratory 1

NE455D Nanostructured Materials Laboratory 2

List A Technical Electives:

NE 335 Soft Nanomaterials

NE 353 Nanoprobing and Lithography

NE 491 Nanostructured Materials

NE 496 Nanomaterials for Electrochemical Energy Systems

List B Technical Electives:

NE 459 Nanotechnology Engineering Research Project*

CHE 543 Polymer Production: Polymer Reaction Engineering

ME 435 Industrial Metallurgy

ME 533 Non-metallic and Composite Materials

***With approval from the Associate Director (students)**

Appendix B: Faculty of Environment

Senate Undergrad Council
Faculty of Environment
November 21, 2023

For Approvals:

~~Courses: (attachment 1)~~

- ~~1. New~~
- ~~2. Revised~~
- ~~3. Inactivate~~

Secretary Note: Courses and Minor Modifications (Items 1, 2, 3, 6, 7, 8, 9, 10, & 11) are for consideration as part of the consent agenda.

New Academic Plans/Programs (major):

4. Planning Honours: Social Planning and Community Development Specialization (attachment 2)

Academic Plan changes (major):

5. Planning Honours: Environmental Planning and Management Specialization, Land Development Planning Specialization, Urban Design Specialization (attachment 3)

~~Academic Plan changes (minor):~~

- ~~6. Diploma in Environmental Assessment (attachment 4)~~
- ~~7. Environment and Business Honours (attachment 5)~~
- ~~8. Knowledge Integration Honours (attachment 6)~~
- ~~9. Knowledge Integration Honours: Collaborative Design Specialization and Science, Technology, and Society Specialization (attachment 7)~~
- ~~10. Planning Honours (attachment 8)~~
- ~~11. Urban Studies Minor (attachment 9)~~

Academic Plan inactivations (major):

12. Planning Honours: Decision Support and Geographical Information Systems Specialization (attachment 10)

Academic Regulation revisions:

13. Diploma of Excellence in Geographic Information Systems removal of invalid combination with Planning (attachment 11)
14. Diploma of Sustainability invalid combination with Sustainability and Financial Management (attachment 12)
15. Overview of Co-op plan requirements (attachment 13)
16. Repeated Course text (attachment 14)

Planning Honours, Social Planning and Community Development Specialization: New

Effective date: September 2024

Rationale: New specialization developed as part of the curriculum review. See attachment 8 for rationale overviewing the changes proposed by the School of Planning, specifically addressing *emergent priorities in planning theory and practice*.

Quality Assurance was consulted.

Description to be added to the Planning webpage:

The Social Planning and Community Development Specialization will strengthen students' understanding of the relationship between built form, and social and community well-being. Specifically, students will acquire advanced knowledge of municipal policies, plans and programs that influence social equity, inclusion, capital, and foster community building, cohesion, and justice. Students completing this specialization will be well suited for a range of planning positions where social issues and community development are a priority.

Governance:

UGSC – July 19, 2023

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Specialization average will be 75% as with all Planning Specializations.

Social Planning and Community Development Specialization

Successful completion requires:

1. 2.5 units distributed as follows:

- **PLAN 233** Social Planning and Community Development
- **PLAN 333** Neighbourhood and Community Planning
- At least 1.5 units from (see additional conditions):
 - **PLAN 380** Crime and the City
 - **PLAN 414/REC 425** Heritage Conservation Planning
 - **PLAN 431** Issues in Housing
 - **PLAN 432/GEOG 432/HLTH 420** Health and the Built Environment
 - **PLAN 433** Social Issues in Planning
 - **PLAN 441** Disabling Environments and Accessibility in Planning
 - **PLAN 442** Indigenous Peoples and Planning
 - **PLAN 443** Planning for Ethno-cultural Diversity and Difference
 - **PLAN 445** Gender and Queer Inclusive Planning
 - **PLAN 480** Planning Theory and Practice Abroad
 - **PLAN 485** Projects, Problems, and Readings in Planning
 - One of:
 - **REC 422** Urban Recreation
 - **SDS 312R/SWREN 312R** Homelessness and Public Policy

Additional condition for all specializations, except Urban Design:

PLAN 490 Senior Honours Essay (1.0 unit) topics - if related to the specialization - may be approved as an elective course requirement by the [associate director, undergraduate studies, School of Planning](#).

Planning Honours: Environmental Planning and Management Specialization, Land Development Planning Specialization, Urban Design Specialization: Revision

Effective date: September 2024

Rationale: Specialization revisions are part of the curriculum review. See attachment 8 for rationale overviewing the changes proposed by the School of Planning. Students have been consulted about these changes.

The required courses for the specializations are being removed as they are core for Honours Planning, meaning students must take and complete these courses regardless.

For Specializations for which a name change is being proposed, students will be provided with an option of which specialization they wish to graduate with (as of June 2025 convocation). Students are expected to meet the requirements that align with the specialization name. The Application for Graduation form will require updating to reflect the title options. Communications to students, regarding Specialization title options, will be forthcoming.

Quality Assurance was consulted.

Specialization Descriptions:

Environmental Planning Specialization

The Environmental Planning Specialization strengthens students' understanding of community sustainability, environmental policy and regulation, the social, economic, and environmental outcomes of different land use options, climate change adaptation and mitigation, and biodiversity conservation. Students completing this specialization will acquire skills in systems thinking, impact assessment, nature-based solutions, and sustainable development. They will be well suited for jobs in community sustainability planning, conservation planning, and environmental assessment.

Land Use, Transportation, and Infrastructure Planning Specialization

The Land Use, Transportation & Infrastructure specialization strengthens students' understanding of the relationship between land-use and transportation. Students completing this specialization will develop strong skills in systems thinking, and physical planning at a regional scale. Graduates with this Specialization would be ready to work in the transportation sector, land development industry, municipal planning, or private planning practice.

Urban Design Specialization

Urban design prepares students to think about the physical/built form of cities and to develop creative solutions that make our communities and neighborhoods more livable, socially, and environmentally sustainable, and aesthetically appealing. Through a combination of studios, seminars and lecture-based learning methods, students are given a foundation in urban design theories and case studies, graphic communication and visualization techniques, spatial analysis and planning methods, and sustainable design principles.

Governance:

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2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

Environmental Planning and Management Specialization

The Environmental Planning and Management Specialization is for students intending to integrate ecology and environmental management into their career plans. It is intended for those with an urban focus as well as for students with rural, resource hinterland, or park planning interests.

Successful completion requires:

1. ~~3.5~~ units distributed as follows:

- ~~ENVS 200~~ Field Ecology
- ~~PLAN 340~~ Canadian Environmental Policy and Politics
- ~~PLAN 341/GEOG 368~~ Conservation/Resource Management of the Built Environment
- At least 2.0 units from (see additional condition):
 - ~~PLAN 432/GEOG 432/HLTH 420~~ Health, Environment, and Planning
 - ~~PLAN 440~~ Urban Services Planning
 - ~~PLAN 451~~ Tools for Sustainable Communities
 - ~~PLAN 452~~ Policy Analysis and Program Evaluation
 - ~~PLAN 453/GEOG 453~~ Urban Stormwater Management
 - ~~ENVS 401~~ Canadian Law, Indigenous Peoples, and Natural Resource Development
 - ~~ENVS 433/REC 433~~ Ecotourism and Communities (1.0 unit)
 - ~~ENVS 444~~ Ecosystem and Resource Management in Parks/Natural Areas
 - ~~ENVS 469~~ Landscape Ecology, Restoration and Rehabilitation
 - ~~ERS 315~~ Environmental and Sustainability Assessment 2
 - ~~ERS 316~~ Urban Water and Wastewater Systems: Integrated Planning and Management
 - ~~ERS 382~~ Ecological Monitoring (1.0 unit)
 - ~~ERS 404/PSCI 432~~ Global Environmental Governance
 - ~~ERS 484/GEOG 404~~ Soil Ecosystem Dynamics
 - ~~GEOG 459~~ Energy and Sustainability (1.0 unit)

Successful completion requires:

1. 2.5 units distributed as follows:

- **PLAN 340** Canadian Environmental Policy and Politics
- **PLAN 451** Environmental Planning in Rural and Regional Systems
- At least 1.5 units from (see additional conditions):
 - **PLAN 358** Planning Agricultural Systems
 - **PLAN 414** Heritage Conservation Planning
 - **PLAN 417** Aggregate Resources Planning, Development, and Management
 - **PLAN 440** Urban Services

- **PLAN 453/GEOG 453** Urban Stormwater
- **PLAN 480** Planning Theory and Practice Abroad
- **PLAN 485** Projects, Problems, and Readings in Planning
- Up to 1.0 units from:
 - **ENVS 401** Canadian Law, Indigenous Peoples, and Natural Resource Development
 - **ENVS 444** Ecosystem and Resource Management in Parks/Natural Areas
 - **ENVS 469** Landscape Ecology, Restoration and Rehabilitation
 - **ERS 316** Urban Water and Wastewater Systems: Integrated Planning and Management
 - **ERS 372** First Nations and the Environment

~~Land Development Planning Specialization~~ Land Use, Transportation, and Infrastructure Planning Specialization

~~The Land Development Planning Specialization trains planning students to develop or redevelop land in communities. Land development planners practice in complex, high profile, and often contentious decision-making environments. To be effective practitioners in this planning context, students acquire a good working knowledge of land use planning regulations, planning law, policy, and land development issues. Graduates with this Specialization would be ready to work in the land development industry, municipal planning, or private planning practice.~~

~~Successful completion requires:~~

1. ~~5.5 units distributed as follows:~~
 - ~~PLAN 103~~ Planning, Administration, and Finance
 - ~~PLAN 233~~ People and Plans
 - ~~PLAN 261~~ Urban and Metropolitan Planning and Development
 - ~~PLAN 346~~ Advanced Tools for Planning: Public Participation and Mediation
 - ~~PLAN 401~~ Planners and Planning Tribunals
 - ~~PLAN 483~~ Land Development Planning
 - ~~ENVS 201~~ Introduction to Canadian Environmental Law
 - ~~At least 2.0 units from (see additional condition):~~
 - ~~PLAN 320/GEOG 319~~ Economic Analyses for Regional Planning
 - ~~PLAN 349/GEOG 349~~ Urban Form and Internal Spatial Structure
 - ~~PLAN 362~~ Regional Planning and Economic Development
 - ~~PLAN 450/GEOG 450~~ Changing Form and Structure of Metropolitan Canada
 - ~~PLAN 471~~ Planning Law
 - ~~PLAN 478/CIVE 440~~ Transit Planning and Operations
 - ~~PLAN 484/CIVE 484~~ Physical Infrastructure Planning

~~Successful completion requires:~~

1. ~~2.5 units distributed as follows:~~
 - **PLAN 203** Transportation Planning and Mobility
 - **PLAN 483** Land Development Planning
 - ~~At least 1.5 units from (see additional conditions):~~
 - **PLAN 320/GEOG 319** Economic Analysis for Regional Planning
 - **PLAN 349/GEOG 349** Urban Form and Spatial Structure

- **PLAN 414/REC 425** Heritage Conservation Planning
- **PLAN 415** Urban Planning in China
- **PLAN 416** Modelling the City
- **PLAN 431** Issues in Housing
- **PLAN 432/GEOG 432/HLTH 420** Health and the Built Environment
- **PLAN 440** Urban Services
- **PLAN 477** Freight Planning and Policy
- **PLAN 478/CIVE 440** Transit Planning and Operations
- **PLAN 484/CIVE 484** Physical Infrastructure Planning
- **PLAN 480** Planning Theory and Practice Abroad
- **PLAN 485** Projects, Problems, and Readings in Planning

Urban Design Specialization

The Urban Design Specialization acknowledges the student's competence in design and prepares them for work in public and private practice. Urban design focuses on the look and feel of our communities. An urban designer might be part of creating, for example, public squares, urban streetscapes, or urban parks. This Specialization also provides a sound foundation for graduate studies in urban design.

Successful completion requires:

1. ~~4.0 units distributed as follows:~~
 - ~~PLAN 110~~ Visual Approaches to Design and Communication
 - ~~PLAN 210~~ Community Design Fundamentals for Planners
 - ~~PLAN 211~~ Design Studio Foundations
 - ~~PLAN 409~~ Urban Design Studio (1.0 unit)
 - ~~At least 1.5 units from (see additional condition):~~
 - ~~PLAN 309~~ Site Planning and Design Studio
 - ~~PLAN 313~~ Community Design Studio (1.0 unit)
 - ~~PLAN 408~~ Urban Design Seminar
 - ~~PLAN 414/REC 425~~ Heritage Planning Workshop
 - ~~PLAN 431~~ Issues in Housing

Successful completion requires:

1. **2.5 units distributed as follows:**
 - **PLAN 211** Design Studio Foundations
 - **PLAN 309** Site Planning and Design Studio
 - **PLAN 408** Urban Design Seminar
 - **PLAN 409** Community Design Studio (1.0 unit)

Additional condition for all specializations, **except Urban Design:**

PLAN 490 Senior Honours Essay (1.0 unit) topics - if related to the specialization - may be approved as an elective course requirement by the [associate director, undergraduate studies, School of Planning](#).

Planning Honours: Decision Support and Geographical Information Systems Specialization:
Inactivation

Effective date: September 2024

Rationale: The Faculty of Environment offers the Diploma in Geographic Information Systems that closely mirrors this specialization. Planning students who are interested in Geographic Information Systems will be directed to complete the diploma (see attachment 11).

Quality Assurance was consulted.

Governance:

UGSC – July 19, 2023

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2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

~~Decision Support and Geographic Information Systems Specialization~~

~~Geographic information systems (GIS) are used commonly by planners to manage, analyze, and visualize data related to urban planning and resource management. Students completing this specialization will have a sound grasp of the principles of GIS and the means to apply this technology effectively in research capacities and in planning practice. [The Diploma of Excellence in Geographic Information Systems is not available to students graduating with this specialization.](#)~~

Successful completion requires:

~~1. 3.5 units distributed as follows:~~

- ~~○ [ENVS 278](#) Applied Statistics for Environmental Research~~
- ~~○ [PLAN 281/GEOG 281](#) Introduction to Geographic Information Systems (GIS)~~
- ~~○ At least 2.5 units from (see additional condition):~~
 - ~~▪ [PLAN 381/GEOG 381](#) Advanced Geographic Information Systems~~
 - ~~▪ [PLAN 387/GEOG 387](#) Spatial Databases~~
 - ~~▪ [PLAN 481/GEOG 481](#) Geographic Information Systems Project (1.0 unit)~~
 - ~~▪ [PLAN 487/GEOG 487](#) Management Issues in Geographic Information Systems~~

Diploma of Excellence in Geographic Information Systems: Revision

Effective date: September 2024

Rationale: The School of Planning is inactivating their Decision Support and Geographic Information Systems Specialization (see attachment 10); therefore, the invalid combination can be removed from the Diploma of Excellence in Geographic Information Systems, allowing Planning students to complete this credential.

Note: This invalid combination needs to be removed from the University Invalid Credential Combination page (<http://ugradcalendar.uwaterloo.ca/page/Acad-Regs-Invalid-Credential-Combinations>)

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

The Diploma of Excellence in Geographic Information Systems is ~~not available to School of Planning students graduating with the Decision Support and Geographic Information Systems Specialization.~~

Diploma in Sustainability invalid combination with Sustainability and Financial Management,
Honours: Revision

Effective date: September 2024

Rationale: These two academic credentials have overlapping courses and learning outcomes. Also, due to the structure of the Diploma in Sustainability it is not possible for students in Sustainability and Financial Management, to complete the out of faculty requirements. SFM was consulted and has approved this invalid combination which was presented to Arts as an information item.

Note: This invalid combination needs to be added to the University Invalid Credential Combination page (<http://ugradcalendar.uwaterloo.ca/page/Acad-Regs-Invalid-Credential-Combinations>)

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

Revisions below are being shown using calendar text that was approved at SUC Feb 14/23, effective September 2024. Strikethrough for removal and bold for addition of text.

Diploma in Sustainability

The Diploma in Sustainability is not available to **students in Sustainability and Financial Management Honours**, School of Environment, Resource and Sustainability Honours ~~students~~, nor to students graduating with a Joint Environment, Resource and Sustainability degree.

Overview of Co-op plan requirements: Revision

Effective date: September 2024

Rationale: Students may not be able to continue in Co-op after 3B term, if missing one Co-op requirement. This would apply if an outstanding PD course cannot be completed on an academic term, or there is no opportunity to revise study/work sequencing.

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

Notes

1. Students missing ~~two (or more)~~ **a** co-op requirements by the end of their 3B term will normally be removed from co-op, unless they have successfully been employed for four work terms. These students will remain in co-op but will not be eligible for a co-op degree.

Repeat course rule: Revisions

Effective: September 2024

Rationale: Combining and clarifying counting and calculation rules and processes for repeating courses.

Governance:

UGSC – July 19, 2023

FC – September 14, 2023

2023/24 Calendar text, including additions (bolded) and deletions (strikethroughs)

Remove from Academic Standing section: <http://ugradcalendar.uwaterloo.ca/page/ENV-Academic-Standing>

~~Repeated Courses~~

~~When a course is repeated, both grades will appear on the student's record and will be included in the calculation of the cumulative overall average. If the course is part of the major requirement, both grades will also be included in the cumulative major average.~~

Revise text in the ENV Course enrolment and Grades section:

<http://ugradcalendar.uwaterloo.ca/page/ENV-Courses-Enrolment-and-Grades>

Repeating ~~Passed~~ Courses

Normally, special permission, beyond course requisites, is not required to repeat a failed course.

Students must submit a Petition for Exception to Academic Regulations to repeat a course they have already passed and for which they have achieved credit. **If approval to repeat a passed course is granted, only one of the two attempts will count towards an academic credential(s).**

All course attempts will be calculated in plan averages.

Memorandum

To: Tim Weber-Kraljevski, Associate University Secretary
CC: Chris Read, Associate Provost, Students
Ian Rowlands, Associate Vice-President, International
From: Pam Charbonneau, Director, Student Success Office (SSO)
Sacha Geer, Manager, International Mobility and Intercultural Learning, SSO
Sandra López-Rocha, Intercultural Learning Specialist, SSO

Date: 12th October 2023

RE: Recommendation to inactivate the Global Experience Certificate (GEC)

Background

Since its launch in 2009, the [Global Experience Certificate](#) (GEC) has supported students seeking to become globally engaged learners. Students who have completed the GEC requirements are recognized with a certificate presented on convocation and by listing the certificate on their transcript. Currently, the GEC requires students to complete four components:

- Three for-credit courses (1.5 units), specifically two first-year sequential language courses and one Global Studies course
- One international experience (IE) of minimum 6 consecutive weeks
- One intercultural volunteer experience (IVE) of minimum 20 hours during a single term
- One written reflection piece

Summary

- Since the GEC's inception, and up to October 2023, 540 students have graduated from the program (ARTS 307; ENV 105; MATH 41; SCI 38; HEALTH 33, and ENG 16).
- As of August 2023, there are 89 students enrolled in the program (ARTS 48; ENG 4; ENV 17; HEALTH 7; MATH 8; SCI 5).
- There are only 12 international students currently enrolled in the GEC.

Rationale

Staff responsible for the GEC carried out a systematic assessment of the program to identify a) challenges students face to complete the certificate, and b) perceived benefits from obtaining the certificate. The findings suggest students are primarily unable to obtain a GEC due to program restraints, which are most significant for STEM students (i.e., inability to incorporate required courses), costs associated with travel, changing plans in a way that prevents them to complete a term abroad, and difficulties completing the volunteering hours within a single term. The perceived benefits of obtaining a GEC that students identified include bolstering their international experience, developing transferable skills, increasing their employability, and showcasing their achievements.

Following up on these findings, the Student Success Office's (SSO) Intercultural Learning Specialist carried out a consecutive environmental scan, literature review, and assessment of the GEC and highlighted the findings below.

- Graduation rates are low and point at a significant and continuous decrease, for instance:
 - The number of students graduating with a GEC in 2017 = 73; in 2018 = 72; in 2019 = 55.

- Only 32 students are graduating with a GEC in 2023.
- Although there are 89 students currently enrolled in the program, new enrolment numbers continue to be low (e.g., as of August 2023, only 33 students have enrolled in the program since the beginning of the year). These numbers were negatively affected during the pandemic and have not reached pre-pandemic rates. In addition, a percentage of current students is likely to withdraw from the GEC when they face challenges to complete the requirements.
- Marketing efforts are not effective; students are able to identify benefits of participating in the GEC but are often unable to obtain it due to the barriers listed above. This makes the program inaccessible to the general student population.

Further assessment of the GEC involved collecting data from focus groups where University of Waterloo students were invited to react to a new proposed certificate: GLIDE (Global Learning and Intercultural Development Experience). Students' responses were highly positive towards the proposed offering, as it focuses on removing challenges associated with completing the GEC and offers benefits to students in addition to what they identified during the prior assessment of the GEC.

Recommendation to inactivate the GEC

Taking into consideration the result of the internal assessment and student responses,

- we recommend inactivating the GEC, with an effective date of September 1, 2024. After that, we will offer students the opportunity to enrol in a new certificate of completion (GLIDE) that seeks to better serve students by increasing flexibility of completion and promoting inclusivity.
- GLIDE will be defined as a *certificate of completion*, and as such it will not be governed by Senate, not be listed in the Undergraduate Studies Academic Calendar, not appear on a student's record and transcript, and the certificate will be produced by the Student Success Office and not the Office of the Registrar. The SSO's Global Learning Team will administer all aspects of GLIDE and will provide students with a certificate of completion at the end, which can be highlighted on a resume.

Benefits of the new certificate of completion

GLIDE would allow us to:

- ***Foster inclusivity and offer intercultural education for all.*** Not all UW students are able to travel abroad to complete an international experience due to health (physical and mental), personal, socioeconomic, and program-related concerns. The new certificate will welcome, but not require, travel but will still provide graduate and undergraduate students with the opportunity to engage and learn interculturally. This also translates into further opportunities for underrepresented students to engage in guided programming and more meaningful interactions across cultures.
- ***Acknowledge and enhance international students' experiences.*** International students at UW who are interested in pursuing a GEC are required to complete an experience outside of the country even if Canada is already an international location for them. This will no longer be the case under the new certificate.
- ***Promote intercultural development and internationalization at home.*** Research shows that students involved in activities at home can develop awareness, gain knowledge, and improve their intercultural perceptions through purposeful engagement on campus and within the community with comparable and potentially heightened results. This has been considered in the development of GLIDE.
- ***Provide a platform supporting student communities.*** Domestic and international students will have greater opportunities to enhance their interactions and learn from each other through participation and reflection. This further supports efforts around understanding anti-racism and culturally constructed behaviours.

- **Adhere to UW's 2020-2025 Strategic Plan.** Understanding that internationalization happens in different ways and our students can benefit from participating in activities that open their minds to other perspectives; developing talent and skills through interpersonal and experiential learning; supporting sustainable learning environments while minimizing carbon footprint.

Considerations inactivating the GEC

Communication Campaign

Prior to the inactivation of the GEC on September 1, 2024, the SSO will lead a communications campaign to warn students who may not have declared their intention to obtain a GEC, but who may have an intention to pursue the certificate. Any student interested in pursuing a GEC, who applies for this certificate before September 1, 2024, will be supported as they complete the GEC requirements.

Support for students

On September 1, 2024, we will close admission to any student who has not declared their intention to obtain a GEC. Students on track to obtain a GEC will be offered two options:

- a. continue with their plan to obtain a GEC; they will be supported as they complete the remaining GEC requirements, the certificate program will be listed in their transcript, and will receive the certificate on convocation.
- b. transfer to the new GLIDE certificate, count their work towards completing required components, and obtain the certificate of completion from the SSO, thus benefiting from the additional flexibility and options to obtain the GLIDE certificate.

Undergraduate Studies Academic Calendar

- The new GLIDE certificate will be a non-calendar item.
- The GEC to be removed from the UG calendar, starting September 1, 2024.
- There are no amendments to be made in the 2023-2024 calendar since the inactivation of the GEC would be reflected in a future calendar (2024-2025).

Office of the Registrar

- The Office of the Registrar will not be responsible for producing certificates related to GLIDE; the certificate of completion will not appear on the students' transcript and will not be presented on convocation.
- Certificates from the Office of the Registrar would only be provided for the remaining students on track to obtain a GEC, who will still have the GEC listed on their transcript and will receive the associated certificate on convocation.

Summary of recommendations to be approved by Senate:

1. Inactivate the Global Experience Certificate (GEC), with an effective date of September 1, 2024.
2. Students who declared their intention to obtain a GEC prior to the inactivation of the GEC and wish to continue pursuing this certificate, will continue to have the GEC listed on their transcript and receive the certificate on convocation.

For Recommendation

Public

Open Session

To: Senate Undergraduate Committee**Sponsor:** David DeVidi. Cathy Newell Kelly
Contact Information: david.devidi@uwaterloo.ca cnkelly@uwaterloo.ca**Presenter:** Jennifer Coghlin
Contact Info: jennifer.coghlin@uwaterloo.ca**Date of Meeting:** November 21, 2023**Item Identification:****Short-Term Self-Declared Absences (Presentation)**
Academic Considerations and Accommodations (Document)**Summary:**

Early 2019, the Verification of Illness Working Group was formed, with cross-campus representation, to implement recommendations regarding Verification of Illness articulated in the 2018 President's Advisory Committee on Student Mental Health.

In March 2021, a report was presented at the Undergraduate Operations meeting, outlining the work of the Verification of Illness Working Group, and recommending a process by which students could self-declare a short-term illness, without the need for formal documentation.

In the months that followed the Association Deans, Undergraduate, and the Registrar's Office used the learning that was gathered during the pandemic and the process students used to self-declare Covid-19 related illness or a requirement to self-isolate, to develop a pilot process for students to self-declare a short-term illness within Quest. The pilot began during the fall 2022 term.

The pilot will conclude at the end of the spring 2024 term. To move out of the policy phase for the short-term absences, the Undergraduate Academic Calendar language requires updating. Additional updates to the Undergraduate Academic Calendar text have been proposed to reflect practice and increase clarity.

Recommendation/Motion:

That, effective for the 2024-2025 Undergraduate Studies Academic Calendar, the section titled "**University Policies, Guidelines and Academic Regulations, Assignments, Tests, and Final Exams, Accommodations**" be updated with the text provided titled "**University Policies, Guidelines and Academic Regulations, Assignments, Tests, and Final Exams, Academic Considerations and Accommodations**".

Governance Path:

Reviewed by Undergraduate Operations, September 28, 2023 and October 26, 2023

Recommendation for Approval by Senate Undergraduate Committee, TBD

Approval by Senate, TBD

SELF-DECLARED SHORT-TERM ABSENCE PILOT

10/18/23

Jennifer Coghlin

Associate Registrar, Enrolment Services and Academic Policy

Office of the Registrar



INTRODUCTION

Since the beginning of the COVID-19 pandemic, students have been able to use Quest to self-declare a COVID-19 related absence due to illness or a requirement to self-isolate.

This process has been well received across campus and as one result of this, an additional option for undergraduate students was created: the ability to self-declare a short-term absence.

The short-term absence self-declaration option is currently considered a pilot and thus is not reflected in the Undergraduate Studies Academic Calendar. Regulations related to accommodation need to be updated and sent through the regular approval bodies.

BACKGROUND

Early 2019, the Verification of Illness Working Group was formed, with cross-campus representation, to implement recommendations regarding Verification of Illness articulated in the 2018 President's Advisory Committee on Student Mental Health.

In March 2021, a report was presented at the Undergraduate Operations meeting, outlining the work of the Verification of Illness Working Group, and recommending a process by which students could self-declare a short-term illness, without the need for formal documentation.

In the months that followed the Association Deans, Undergraduate, and the Registrar's Office used the learning that was gathered during the pandemic and the process students used to self-declare Covid-19 related illness or a requirement to self-isolate, to develop a pilot process for students to self-declare a short-term illness within Quest. The pilot began during the fall 2022 term.

SHORT-TERM ABSENCE

- It is an absence that is a maximum length of two calendar days (i.e., Tuesday, February 8 and Wednesday, February 9).
- The declaration of a short-term absence is available to all undergraduate students taking courses at the University of Waterloo.
- Only one short-term absence can be self-declared per academic term.
- Short-term absences are self-declared in Quest. No accompanying documentation is requested or required in order to self-declare a short-term absence.
- Once submitted, it cannot be changed or cancelled in Quest without the intervention of your faculty's associate dean, undergraduate.
- <https://uwaterloo.ca/registrar/current-students/undergraduate-student-short-term-absences>

STATISTICS

As of November 10, 2023, 8:15am

| TERM | TOTAL SUBMISSIONS | COVID-19 RELATED | SHORT-TERM |
|--------------|-------------------|------------------|---------------|
| Fall 2023 | | 693* | 3,052* |
| Spring 2023 | | 365 | 2,544 |
| Winter 2023 | | 1,284 | 4,560 |
| Fall 2022 | | 2,927 | 3,779 |
| | | | |
| TOTAL | 23,167** | 5,269 | 13,935 |

*to date

**beginning March 2020

CHANGES/UPDATES MADE SINCE SPRING 2023

- Wording changes
 - “48-hours” to “2 days”
- Restriction on use for components of Laboratory (LAB) and Clinic (CLN)
- Reduction in submission maximum for Covid-19 Related Absences from 99 to 1
- Combining of Illness and Self-isolation for Covid-19 Related Absence submissions
- Updates to websites
- Updates to Quest pages

NEXT STEPS

- Academic Calendar Wording Changes
 - Undergraduate Operations Committee (October 2023)
 - Senate Undergraduate Committee (November 2023)
 - Senate (December/January 2023)
- Pilot to be completed at the end of the 2024 spring term
- Ongoing updates and improvements to web and Quest content

UNIVERSITY OF WATERLOO



Jennifer Coghlin
Associate Registrar, Enrolment Services and Academic Policy
jennifer.coghlin@uwaterloo.ca

EXISTING

University Policies, Guidelines and Academic Regulations Assignments, Tests, and Final Exams Accommodations

From time to time, students will encounter extenuating circumstances such as significant illnesses, ongoing medical conditions, or religious observations that prevent them from meeting academic obligations. The University is committed to assisting students who experience these events.

Students who are unable to meet assignment due dates or write a test must provide documentation verifying the events that have precluded them from meeting their academic deadlines. Elective arrangements (such as travel plans) are not considered acceptable grounds for granting an accommodation.

Accommodation Guidelines

When instructors elect to provide an accommodation, the options available to students vary based on the nature of the extenuating circumstances they are facing, and on the kind of evaluation mechanism they are unable to complete on time.

For **in-term assignments**, instructors may use their discretion and allow an extension. If the instructor does not grant an extension and an element is missed, it is recommended that the weight of the missed element – an assignment, a laboratory report, or other evaluation mechanism – be transferred to similar types of elements due later in the term. If this option is not available, the weight of the missed assignment may be transferred to a test or the final examination.

NEW DRAFT

University Policies, Guidelines and Academic Regulations Assignments, Tests, and Final Exams Academic Considerations and Accommodations

Students' ability to complete some component of a course may be affected by short-term extenuating circumstances or long-term or chronic medical conditions (physical or mental). For short-term extenuating circumstances, the term Academic Consideration is applicable and provides students with consistent, fair, and pedagogically appropriate consideration, without compromising the academic integrity of the course or program. Short-term extenuating circumstances might include common illness and ailments such as a cold or flu, minor injuries, compassionate/personal/wellness needs (unrelated to a disability/condition), bereavement, and participation in University of Waterloo sanctioned academic or athletic events that prevent them from meeting academic obligations.

In comparison, the term Academic Accommodations are modifications or adjustments to the way a student receives course curriculum and materials, participates in course activities, or demonstrates knowledge of course content and skills. Reasonable accommodations reduce or eliminate barriers in the academic environment but are not intended to alter the fundamental purpose or essential requirements of the academic program, milestone, or course. The University has a legal duty to accommodate students on a variety of grounds protected from [discrimination](#) including disability (which includes physical and mental health related conditions), creed, family status, and sex (including pregnancy and breast feeding).

If students are granted an accommodation for a **test**, the weighting of the missed test is added to the final examination weighting or spread over the remaining tests. Term tests are normally not deferred.

If a student is granted an accommodation to postpone a **final examination**, the exam is to be written no later than the student's next academic term when the course is offered. The examination may be written earlier if the student and the instructor mutually agree upon a time. The academic delegate from the unit offering the course should be informed of any arrangement for a make-up examination. If the course instructor is not available to set and mark the make-up examination as well as grade the course overall, the academic unit will arrange for these activities to be carried out.

Any unresolved disputes between instructors and students regarding the legitimacy of extenuating circumstances or the suitability of accommodations will be decided by the appropriate associate dean(s). When in doubt, students should approach the associate dean (undergraduate) from their home faculty. In such cases, any regularly scheduled University academic activity will be given precedence in the resolution of a conflict with a test or examination in another course. For students in courses taught at the Affiliated and Federated Institutions of Waterloo where there is no associate dean, the dean exercises these responsibilities.

Accommodations Due to Illness

Whether through Academic Consideration or Academic Accommodation, the University supports and upholds the duty to accommodate, and provides support to students who are experiencing extenuating circumstances.

Elective arrangements (such as travel plans) are not considered acceptable grounds for granting an academic consideration. Students who have long-term or chronic medical conditions (physical or mental) which may impede their ability to complete academic responsibilities are directed to seek academic accommodations through AccessAbility Services.

Academic Considerations

Academic Considerations for Short-Term Absences

Student may require a short-term absence from their academic responsibilities for any reason. For academic obligations during the Formal Lecture Period, students may self-declare a short-term absence within the student information system (Quest) using the Self-Declaration of Absence Form. Self-declared short-term absences will not be accepted for the course/class components of Clinic (CLN), Laboratory (LAB), and Studio (STU).

Students will be permitted one short-term absence declaration per academic term. Thereafter, the student will be required to submit a University of Waterloo Verification of Illness Form (VIF) or register for academic accommodations with AccessAbility Services (depending on the nature of the reasons for the absence).

When illness is the cause of a missed deadline, students should seek medical treatment and provide confirmation of the illness to the instructor(s) within 48 hours by submitting a completed **University of Waterloo Verification of Illness form** to support requests for accommodation due to illness. Students in Centre for Extended Learning (CEL) courses must submit their confirmation of the illness to the CEL.

The University of Waterloo Verification of Illness form is normally the only acceptable medical documentation. Students who consult their physician or use the services of an off-campus walk-in clinic must provide this form to the attending physician for completion; notes and forms created by the physician or clinic are normally not acceptable. Although not compelled to do so, instructors may accept medical documentation that contains the same information specified on the University of Waterloo Verification of Illness form. Health Services charges a fee for completing the University of Waterloo Verification of Illness form that is not covered by OHIP/UHIP. Fees for this service or those levied by off-campus practitioners are the student's responsibility.

False claims of illness and/or the submission of false supporting documentation of extenuating circumstances constitute an academic offence that will result in disciplinary action under **Policy 71**.

Adjustment of due dates or deferrals of term tests or final examinations are not automatic upon the presentation of suitable medical verification. Instructors will use this

A self-declared short-term absence will excuse students from their academic responsibilities for up to 2 consecutive calendar days. It applies to all courses (but not to CLN, LAB, or STU components, as noted above). There is no expectation that a self-declared short-term absence be total; that is, students may elect to participate in any course and complete any course element despite not being required to.

During the 2-day academic consideration period, the instructor cannot require completion of any academic responsibilities. Students must contact the instructor no later than 24 hours after the missed assessment(s). If possible, students should contact the instructor prior to the expected missed assessment(s).

Academic Considerations Due to Illness

When students experience common, short-term illness and require academic consideration, they are required to provide a University of Waterloo Verification of Illness Form, following the faculty specific process for their home faculty, if any one of the following is true:

- Absence is not covered by short-term academic consideration
- Student has used their maximum permissible one self-declared short-term absence previously during the term
- Student is retroactively reporting an illness
- Student is seeking academic consideration due to illness for an academic assessment that falls outside the Formal Lecture Period

Students should seek medical treatment and provide confirmation of the illness within 48 hours of the missed academic obligation by

documentation among all information available to them when determining whether accommodation is warranted.

Accommodations Due to Religious Observances

The University acknowledges that, due to the pluralistic nature of the University community, some students may seek accommodations on religious grounds. Accordingly, students must consult with their instructor(s) within two weeks of the announcement of the due date for which accommodation is being sought. Failure to provide a timely request will decrease the likelihood of providing an accommodation.

Accommodations Due to Final Examination Schedule Conflicts

Senate has determined that the University will strive to schedule final examinations conflict free and with:

- No student having two examinations in a row.
- No student writing in the last period on one day and the first period the next day.
-

Where this cannot be accomplished for a particular student, the University shall ensure **exam relief** by making alternative scheduling arrangements for that student. Students can elect to accept examination combinations that violate these constraints. In doing so, they understand that petitions or appeals based on a violation of the above conflicts will not be granted.

A final examination conflict: two final examinations that are scheduled on the same day, at the same time.

submitting a completed University of Waterloo Verification of Illness Form (VIF) to support requests for academic consideration due to illness.

The University of Waterloo Verification of Illness Form is normally the only medical documentation accepted to support requests for academic consideration. Students who consult their physician or nurse practitioner or use the services of an off-campus walk-in clinic must provide this form to the attending physician for completion; notes and forms created by the physician or clinic are normally not acceptable. Medical documentation that contains the same information specified on the University of Waterloo Verification of Illness Form may be accepted, though the University is not compelled to accept it. Health Services charges a fee for competing the University of Waterloo Verification of Illness Form that is not covered by OHIP/UHIP. Fees for this service or those levied by off-campus practitioners are the student's responsibility.

False claims of illness and/or the submission of false supporting documentation of extenuating circumstances constitute an academic offence that may result in disciplinary action under **Policy 71 (Student Discipline)**.

Adjustment of due dates or deferrals of term tests or final examinations are not automatic upon the presentation of acceptable medical documentation. Documentation along with all other information available will be considered when determining whether academic consideration is warranted.

Students experiencing illnesses or injuries that impact their ability to access and participate in their academics are encouraged to

If students have an examination conflict with a Wilfrid Laurier University final exam that has been detected during the examination scheduling process, the department/instructor will be notified by the Office of the Registrar and asked to contact the individual students to discuss alternative examination arrangements to be determined by the department/instructor.

If students have an examination conflict that was not detected during the examination scheduling process, they must complete the **Final Examination Timetable Conflict Form**. The Office of the Registrar will confirm the conflict, then notify the department/instructor so that they can contact the individual students to discuss alternative examination arrangements to be determined by the department/instructor.

register with AccessAbility Services to explore the need for academic accommodations.

Academic Considerations Due to Final Examination Schedule Conflicts

A final examination conflict is when two final examinations are scheduled on the same day, at the same time.

The University strives to create a conflict-free final examination schedule.

If students have a final examination conflict with a Wilfrid Laurier University final examination that has been detected during the final examination scheduling process, the Office of the Registrar will notify the department/instructor

If students have a final examination conflict that was not detected during the final examination scheduling process, they are required to complete the [Final Examination Timetable Conflict Form](#). The Office of the Registrar will confirm the conflict then notify the department/instructor.

Departments/instructors who have been notified of confirmed final examination conflicts will determine alternative final examination arrangements and contact the impacted students to discuss the alternatives.

The University strives to schedule final examinations with:

- No student scheduled to write two final examinations in a row (i.e., back-to-back periods).

- No student writing in the last period on one day and the first period the next day.

Where this cannot be accomplished for a particular student, the University provides final examination relief by making alternative scheduling arrangements for that student, by shifting one final exam period giving the student an additional hour break. Students can elect to accept final examination combinations that violate these constraints. In doing so, they understand that petitions or appeals based on a violation of the above conflicts will not be granted.

Guidelines for Providing Academic Considerations

University of Waterloo instructors provide academic considerations when appropriate conditions are met (see the criteria above).

When instructors are asked to consider students' extenuating circumstances, the options available to students vary based on the nature of the extenuating circumstances/events they are facing, on the kind of assessment they are unable to complete on time, and the instructor's own grading practices stated in the course outline.

- **For in-term assessments (assignments, poster symposia, presentations, etc.):** Instructors may use an alternative such as extension or transfer of weight to a subsequent assessment or test/exam. Details shall be included in the course outline.
- **For in-term tests and midterm exams:** The weighting of the missed test is normally added to the final examination or spread over the remaining tests. In-term tests are normally

not deferred (unless there are no remaining tests to transfer weight to).

- **For final examinations:** The final examination may be deferred. Normally, it is to be written at a time mutually agreed by the student and instructor that is as soon after the missed examination as possible; in any case it is to be written no later than the student's next academic term in which a) the student has an academic term and, b) the course is offered.
- **For WaterlooWorks arranged co-op interviews:** Employers may follow up with the student, but the University cannot require an employer to reschedule the interview.

Any University academic activity that appears in the Schedule of Classes will be given precedence over alternate arrangements in the resolution of an academic consideration.

Any unresolved disputes between instructors and students regarding the legitimacy of the extenuating circumstances or the suitability of academic considerations will be decided by the appropriate associate dean(s). When in doubt, students should approach the associate dean from their home faculty. For students taught at the Affiliated and Federated Institutions of Waterloo where there is no associate dean, the dean exercises these responsibilities.

Academic Accommodations

Accommodations Due to Disability

The University of Waterloo is committed to upholding the rights of persons with disabilities and creating accessible and inclusive

learning environments for all. AccessAbility Services is the University's centralized office for the management of academic accommodations for all students with known or suspected disabilities and disabling conditions (injuries, medical conditions, and impacts of trauma). Students seeking academic accommodations as a result of disability/disabling conditions will register with **AccessAbility Services** to determine eligibility for academic accommodations, and to develop an academic accommodation plan as required. AccessAbility Services will replay the accommodation plan to instructors, and will work with the instructor and the student to ensure an appropriate accommodation plan is implemented. Disability covers a broad range and degree of conditions that can be permanent, temporary, sporadic, and suspected, including, but not limited to, physical disabilities, learning disabilities, developmental disabilities, mental health disabilities, medical conditions, and the physical, emotional, and psychological effects of a trauma (e.g., sexual violence, discrimination, or oppression).

Refer to the **Student Academic Accommodation Guidelines** for more information on eligibility for academic accommodations, the process for registering with AccessAbility Services, and for information on roles and responsibilities in the accommodation process.

Academic Accommodations Due to Creed/Religion

The University acknowledges that, due to the pluralistic nature of the University community, some students may seek academic accommodations on religious grounds.

Students can complete the religious observance self-declaration form in Quest, which will inform their instructors of the potential

conflict for certain dates. As the dates of important religious observances are generally known well in advance, students must consult with their instructor(s) within two weeks of the announcement of the due date or scheduled examination date for which academic consideration is being sought. The Self-Declaration Form for short-term absences may also be used by students requiring an absence of 2 days or less during the Formal Lecture Period.

Academic Accommodations Due to Other Code Grounds

Students seeking an academic accommodation related to a protected ground (e.g., creed, family status and sex including pregnancy and breastfeeding) should inform their instructor/academic unit as soon as they become aware of the need.

For Approval

To: **Senate Undergraduate Council**

Sponsors: Jeff Casello,
Associate Vice-President, Graduate Studies and Postdoctoral Affairs

Angela Christelis,
Director, Quality Assurance and Continuous Improvement

David DeVidi,
Associate Vice-President, Academic

Date of Meeting: **November 21, 2023**

Agenda Item Identification: **Revisions to Institutional Quality Assurance Process (IQAP)**

Recommendation/Motion:

To endorse to Senate the revisions to the Institutional Quality Assurance Process (IQAP), as presented.

Summary:

The Quality Council updated its Quality Assurance Framework (QAF) which necessitated changes to our IQAP. The following list includes the substantial changes:

- Links to new principles in the QAF
- Expands emphasis on continuous improvement
- Removes specific operational details to a separate document (Procedures)
- For new programs:
 - Creates flexible deadline for progress report
- Requires student consultation for major modifications
- For cyclical program reviews:
 - Requires feedback from employers/professional associations for professional programs
 - Replaces “two year progress report” with a mid-cycle report that will facilitate both a review of progress on action plans created in response to reviews and preparation for the next review
 - Clarification of expectations on all parties for Waterloo programs with substantial AFIW involvement

- Allows virtual site visits but requires site visits to be in-person if infrastructure/facilities are critical to achieving program learning outcomes
- Requires an institutional self-study for QC audit of QA processes.

The most consequential change is the step to remove operational details to a separate Procedures document. This allows changes to processes to occur without revision to the IQAP itself. This is a significant advantage because material changes to the IQAP require approval by both the Senate and the Quality Council, while procedural changes can be implemented much more readily when it becomes clear that they are warranted. This is a substantial step forward in allowing the Academic Quality Assurance and Continuous Improvement to apply continuous improvement principles to its own work, enabling the University to derive increasing value from the efforts required to carry out program reviews.

Some revisions reflect input from consultations carried out by the QACI Office with representatives of programs that completed cyclical reviews in 2022-23. The revisions have been previously discussed and endorsed at Deans Council, and will also be sent to Senate Graduate and Research Council for endorsement.

Documentation Provided:

Appendix A – Proposed Revisions to the IQAP



**UNIVERSITY OF
WATERLOO**

Institutional Quality Assurance Process (IQAP)

Approved by University of Waterloo Senate MONTH, DAY, YEAR
Ratified by the Quality Council MONTH, DAY, YEAR

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INTRODUCTION

In 2010, the [Ontario Universities Council on Quality Assurance](#) (Quality Council or QC) was established by the Ontario Council of Academic Vice-Presidents (OCAV), to provide oversight of a unified undergraduate and graduate quality assurance process under one framework.¹

The [Quality Assurance Framework \(QAF\)](#) follows “international quality assurance standards” to “... facilitate greater international acceptance of our degrees and improve our graduates’ access to university programs and employment worldwide.”² The QAF was updated in 2020, and includes [15 principles](#) to which the Quality Council and universities commit to follow. The QAF also summarizes [Undergraduate Degree Level Expectations \(UDLES\) and Graduate Degree Level Expectations \(GDLES\)](#) to which all academic programs must align.³

This Institutional Quality Assurance Process (IQAP) is consistent with the [QAF](#).⁴ Any significant changes to the IQAP are subject to approval by the University of Waterloo Senate and must be ratified by the Quality Council. Furthermore, the IQAP and associated procedures are subject to regular audit by the Quality Council to ensure that the University of Waterloo adheres to the standards of the QAF.

While consistent with the QAF, the processes described below are understood to advance additional purposes beyond quality assurance. The University of Waterloo is dedicated to the provision of outstanding academic programming. The Quality Assurance process ensures that those who lead the design and delivery of the University’s programs are supported as they carry out a systematic review of their programs. The process also provides opportunities for all stakeholders – students, staff, faculty, and alumni – to provide meaningful input on a program’s academics and the conditions that facilitate their delivery.

Throughout the QA process, program stakeholders are encouraged to reflect on both the strengths of their offerings as well as opportunities to improve. These reflections, when coupled with assessments from arm’s-length experts, regularly affirm our programs’ high quality while identifying pathways by which various aspects may be enhanced. For programs, the process results in a set of well-articulated recommended actions that help set the direction for continuous improvement of our academic programming with appropriate transparency to the University and scholarly community.

¹ [Ontario Universities Council on Quality Assurance \(oucqa.ca\)](#)

² <https://oucqa.ca/framework/quality-assurance-the-international-context/>

³ Note: [Waterloo has added two UDLES](#) to the list created by OCAV: 1) Experiential Learning; 2) Diversity.

⁴ The Quality Assurance Framework will form the standard, should one not be specifically listed within this IQAP.

1.1 Authority

The University of Waterloo Senate is the final authority for ensuring the quality of all academic programs, including cyclical program reviews, new program proposals and major modifications to existing programs.

The Vice-President, Academic and Provost has responsibility for the IQAP and is the primary contact with the Quality Council. The Associate Vice-President, Academic (AVPA) and the Associate Vice-President, Graduate Studies and Postdoctoral Affairs (AVPGSPA) have delegated authority for the IQAP on behalf of the Vice-President, Academic and Provost.

Oversight of undergraduate program reviews, new undergraduate programs and major modifications to existing undergraduate programs rests with the AVPA. Responsibility for graduate program reviews, new graduate programs and major modifications to existing graduate programs rests with the AVPGSPA. Responsibility for combined (or augmented) reviews of undergraduate and graduate programs is shared between the respective portfolios.

In 2016, the Quality Assurance (QA) Office was established to support the AVPA and AVPGSPA in the oversight and monitoring of the IQAP. The QA Office is the primary contact for campus stakeholders regarding cyclical program reviews, new program proposals, and major modifications to existing programs. The Office operationalizes the IQAP and provides timely support to programs undergoing cyclical review, developing new programs and proposing academic program changes.

Detailed explanations and **procedures** for cyclical program reviews, new program proposals and major modifications, as well as contacts in the QA Office are listed on the [Academic Program Reviews](#) website. The information on this website constitutes the University of Waterloo's institutional manual as required by the Quality Council.

IQAP documentation (e.g., self-studies, External Reviewers' Reports, Final Assessment Reports etc.) is retained in accordance with the University of Waterloo's [institutional records retention schedule](#) and Quality Council guidelines.

1.2 Scope of the Quality Assurance Framework

The [QAF](#) guides quality assurance processes in the following four areas:

Cyclical Reviews of Existing Programs ([QAF 5](#))

Cyclical Program reviews are "aimed at assessing the quality of existing academic programs, identifying ongoing improvements to programs, and ensuring continuing relevance of the program to stakeholders."⁵ Cyclical program reviews culminate with a Final Assessment Report (FAR) – a concise synthesis of the program's overall quality and recommendations to improve or maintain its status – submitted for evaluation and approval by Senate Undergraduate Council or Senate Graduate and Research Council and then Senate. A list of programs that underwent

⁵ [Quality Assurance Framework \(oucqa.ca\)](#) (2021)

cyclical review and their Final Assessment Reports are submitted annually to the Quality Council for their review.

Note: programs which have been closed or for which admission has been suspended are out of scope and will not be included in a cyclical review.

New Program Approvals & Expedited Approvals of New Programs ([QAF 2](#))

Proposals for new degree programs and Type 2 and 3 graduate diplomas are required to follow the QAF protocol for proposing new for-credit programs. New program proposals are submitted for evaluation and approval at Senate Undergraduate Council or Senate Graduate and Research Council and then Senate. Following Senate approval, new programs are submitted to the Quality Council's Appraisal Committee for their review and approval. The Appraisal Committee has the authority to approve or decline new program proposals. In addition, new programs, where applicable, are submitted to the Ministry of Colleges and Universities (MCU) for approval of tuition rates and grant funding.

Major Modifications to Existing Programs ([QAF 4](#))

To assure program quality of existing programs, any major substantive change made to an existing program (such that the changes are not significant enough to constitute a new program), is considered a major modification to the program. Major modifications are vetted within the program's home Faculty prior to submission to Senate Undergraduate Council or Senate Graduate and Research Council and Senate for approval. A list of major modifications is submitted annually to the Quality Council for their review.

Audit of the Institutional Quality Assurance Process (IQAP) ([QAF 6](#))

The University of Waterloo is subject to regular audit by the Audit Committee of the Quality Council. The panel examines each institution's compliance with its own Institutional Quality Assurance Process. The audit is to be conducted every eight years and the auditor's report and subsequent institutional response is posted on the [Quality Council website](#).

See [Appendix A](#) for a full listing of programs and levels and the sequence of approval and reporting.

As directed by the QAF (QAF), Waterloo's IQAP covers: *"... continuing undergraduate and graduate degree/diploma programs whether offered in full, in part, or conjointly by any institutions federated and affiliated with the university."*⁶ This also extends *"to programs offered in partnership, collaboration or other such arrangement with other postsecondary institutions including colleges, universities, or institutes"*⁶, as well as new program proposals, expedited approvals and major modifications with any of the aforementioned institutions.

⁶ [Quality Assurance Framework \(oucqa.ca\)](#) (2021)

1.3 Definitions

Quality Council Definitions

The terms listed below receive [specific definitions](#) by the Quality Council, and are used in this IQAP as so defined:

- Academic Services
- Collaborative Specialization
- Course Level Outcomes⁷
- Degree
- Degree Level Expectations⁸
- Degree Program
- Diploma Program (Graduate Type 1, 2, 3)
- Emphasis, Option, Minor Program
- Expedited Approvals
- Field
- Graduate Level Course
- Inter-Institutional Program Categories (Conjoint Degree, Cotutelle, Dual Credential, Joint Degree Programs)
- Major Modification
- Micro-credential
- Mode of Delivery
- New Program
- Professional Master's Program
- Program Objectives⁶
- Program-Level Student Learning Outcomes⁶
- Program of Specialization (major, honours program, concentration or similar)

University of Waterloo Definitions

The University of Waterloo also maintains a list of commonly used terms and their definitions. In some cases, terms may be defined by both the QC and the University. In these cases, the University takes steps to ensure that these definitions while not always exactly the same, are consistent in their intentions and interpretations. Waterloo definitions can be found in the following academic calendars:

- [Undergraduate Academic Calendar Glossary of Terms](#)
- [Graduate Academic Calendar Glossary of Terms](#)

In general, Waterloo defines a **program** as a defined set of requirements or courses common to a particular degree.

⁷ [Program Objectives and Program-level Learning Outcomes — Ontario Universities Council on Quality Assurance \(oucqa.ca\)](#)

⁸ [Appendix 2: OCAV's Undergraduate and Graduate Degree Level Expectations — Ontario Universities Council on Quality Assurance \(oucqa.ca\)](#)

2. NEW PROGRAM APPROVALS

2.1 Aims of New Program Approvals

The procedures for assessing proposals for new programs should ensure that the program:

- meets or exceeds Waterloo’s expectations of academic excellence;
- is appropriately named to align with program content and to be recognizable to students, scholars and employers;
- reflects Waterloo’s distinctiveness and advances the University’s strategic objectives;
- is at the forefront of contemporary thinking in the discipline(s);
- is creative and innovative in its curriculum content and delivery;
- encourages interdisciplinarity as appropriate;
- has the potential to advance the University’s national and global recognition;
- will attract excellent students;
- is sufficiently resourced.

2.2 What Constitutes a New Program

The QAF defines a [new program](#) as:

“Any degree credential (e.g., BMus, Bachelor of Integrated Studies) or degree program (within an existing degree credential), currently approved by Senate or equivalent governing body, which has not been previously approved for that institution by the Quality Council, its predecessors, or any intra-institutional approval processes that previously applied. A change of name, only, does not constitute a new program; nor does the inclusion of a new program of specialization where another with the same designation already exists (e.g., a new honours program where a major with the same designation already exists).”⁹

The QAF further clarifies that: “a ‘new program’ is brand -new: that is to say, the program has substantially different program objectives, program requirements and program-level learning outcomes from those of any existing approved programs offered by the institution.”¹⁰

[Examples of new programs](#) are made available by the Quality Council.

[Flow chart of QAF Overview of the New Program Approval Process](#)

⁹[Definitions — Ontario Universities Council on Quality Assurance \(oucqa.ca\)](#)

¹⁰[Definitions — Ontario Universities Council on Quality Assurance \(oucqa.ca\)](#)

2.3 New Program Approval Process

The following are the steps included in the development of new programs, as outlined in the QAF:

1. A **Statement of Interest** is completed by the new program proponent and submitted to the QA Office (**Procedures**);
2. A **Program Proposal Brief** is completed by the program proponent and approved by the Provost, relevant Faculty Undergraduate/Graduate Committee(s), and Faculty Council(s) (**Procedures**);
3. An **External Evaluation** ([QAF 2.2](#)), including a site visit¹¹, is conducted by qualified, [arm's length](#) reviewers, who submit a report on their findings (**Procedures**);
4. A **Program Response and Dean's Response** ([QAF 2.3](#)) are submitted, summarizing the response to the External Reviewers' Report, and plans for implementing the recommendations (**Procedures**);
5. **Institutional Approval** ([QAF 2.4](#)), including approval at [Senate Undergraduate Council](#) or [Senate Graduate and Research Council](#), and then [Senate](#) takes place (**Procedures**);
6. **Submission to the Quality Council** ([QAF 2.5](#)) occurs separately from the submission to the Ministry of Colleges and Universities, and is coordinated by the QA Office; **the** Appraisal Committee has the ultimate authority to approve or decline new program proposals.
7. **Submission to the Ministry of Colleges and Universities, where applicable**, occurs, separately from the submission to the Quality Council, and is coordinated by [Institutional Analysis and Planning \(IAP\)](#) (**Procedures**);
8. A **Progress Report** will monitor the implementation of the program ([QAF 2.9.2](#)). The Progress Report is internally reviewed and approved by [Senate Undergraduate Council](#) or [Senate Graduate and Research Council](#). The report is subsequently sent to Senate for information (**Procedures**).

A high-level overview of the University's new program approval process flow chart can be found on the [Academic Program Review website](#).

Detailed procedures for new program proposals (steps 1-8) are hyperlinked outside of the IQAP as they are subject to slight changes (i.e., changes in timelines or revisions to the names of institutions or positions, etc.); however, all procedures adhere to the standards outlined within the QAF. No substantial changes are made to the University's procedures without the approval of Senate and the Quality Council. (Note: Editorial changes, changes to deadlines, and similar minor changes do not require such approval.)

Waterloo has developed a website as well as comprehensive templates for the Statement of Interest, Program Proposal Brief (Volume I, II, III), the External Reviewers' Report, Program Response, Dean's Response, as well as the Progress Report. Programs are encouraged to contact the [QA Office](#) at any time for further clarification when developing a new program.

¹¹ All programs will include an in-person site visit, where permissible by public health guidelines.

2.3.1 New Joint Programs with other Universities

The University of Waterloo partners with a number of other institutions to offer a variety of joint programs at both the undergraduate and graduate level; these joint programs result in the conferring of a single degree. Excluded from the notion of ‘joint’ in this context are collaborative programs connected solely at the administrative level in order to assist students to earn mutually independent degrees from each of the partner institutions (e.g., a double degree program - Bachelor of Business Administration from Wilfrid Laurier University and Bachelor of Computer Science from University of Waterloo).

The following principles shall apply to the development process of new joint programs:

- There will be a single new program proposal, which will clearly explain how input was received from faculty, staff and students at each partner institution.
- The selection of arm’s length external reviewers will involve participation by each partner institution, including the appointment of an internal reviewer from each partner institution.
- The external review will involve all partner institutions and preferably all sites, if the review is held in person. Reviewers will consult faculty, staff, and students at each partner institution.
- Feedback on the reviewers’ report will be solicited from participating units at each partner institution, including the deans.
- A single new program proposal package will be submitted jointly to the Quality Council by all partners.
- All partner institutions will agree on the plan to monitor the new joint program, and participate in this monitoring process.
- If the Quality Council approves a new joint program to commence “with report,” each partner institution will sign off on the report before it is submitted to the Quality Council.
- Partner institutions will agree on a common review schedule for the new joint program.

For programs joint with universities outside Ontario, the quality of the program is subject to quality assurance processes in the respective jurisdictions; therefore, the review process must adhere to the procedures outlined in the QAF. It is the responsibility of the Quality Council to determine whether the out-of-province partner is subject to an appropriate quality review process in its own jurisdiction suitably comparable to the Quality Council’s assurance processes.

2.3.2 Statement of Interest

The proponent of a new program, in consultation with the Dean(s) and Associate Dean(s) of the Faculty/Faculties, completes a Statement of Interest that provides an overview of the proposed program.

Once completed, the Statement of Interest is submitted to the QA Office, and reviewed and approved by the AVPA, AVPGSPA or designate. The proponent for the new program may then

begin to prepare the Proposal Brief.

Procedures for the Statement of Interest

2.3.3 Program Proposal Brief

A Program Proposal Brief (Volumes I, II, III) is completed in consultation with faculty, staff and students and alumni of similar programs. The Proposal Brief must follow the template provided, and address the criteria outlined in the QAF Evaluation Criteria ([QAF 2.1.2](#)).

While crafting the proposal brief, proponents are encouraged to engage internal and external stakeholders in formative conversations relative to their portfolios. As examples, proponents should seek input from their Dean on the feasibility of resources that may be necessary; Cooperative and Experiential Education (CEE) should be consulted if the new program may include work integrated learning. It is best practice to have the Proposal Brief informed by potential resource or other limitations.

A critical element in the development of a new program proposal is a financial viability analysis (FVA) conducted by Institutional Analysis and Planning (IAP). Through an FVA, the proposed program's costs – including faculty salaries, space requirements, and other resources (library, technology, etc.) – are compared to the potential revenues from student tuition and government grant. The outcome of the FVA is a report that accompanies the Brief which is then evaluated by the Faculty Dean and the Provost, who formally approves the financial elements of the program.

The completed Program Brief is submitted to the QA Office, which oversees an internal approval process that includes vetting by the AVPA, AVPGSPA or designate. The program is then submitted for approval to the relevant Faculty Undergraduate or Graduate Committee, and then Faculty Council.

Procedures for the Program Proposal Brief

2.3.4 External Evaluation

The QAF specifies new program proposals should be assessed by external academic reviewers ([QAF 2.2.1](#)) using evaluation criteria outlined in the [QAF 2.1.2](#). In addition, the external reviewers will report on the substance of the new program proposal, comment on the adequacy of existing physical, human and financial resources; and acknowledge any clearly innovative aspects of the proposed program together with recommendations on any essential or otherwise desirable modifications to it ([QAF 2.2.2](#))

The Review Committee (also known as the Site Visit Team) consists of two [arm's length](#) external reviewers, and an internal support person from within the institution but outside the discipline.

External reviewers will be selected on following criteria ([QAF 2.2.1](#)):

- normally associate or full professors, or the equivalent—will have suitable disciplinary expertise,
- qualifications and program management experience, including an appreciation of pedagogy and learning outcomes

External reviewers will be nominated by the program in Volume III. The Review Committee is selected by the AVPA, AVPGSPA or designate.

The Review Committee evaluates the academic elements of the proposed program by reading the Proposal Brief (Volumes I and II - CVs) and conducting a site visit to the campus where the program will be offered. While the reviewers may identify additional resources that are of value to the proposed program, a consideration of the financial elements (revenues and expenses) of the proposed program is normally beyond the scope of their assessment. The reviewers' findings from the site visit are presented in an [External Reviewers' Report](#), submitted to the QA Office within two weeks of the site visit. The reviewers are provided with a template for this report to ensure that the report meets the criteria outlined in [QAF 2.2.1](#).

Once received, the report is reviewed by the QA Office and AVPA, AVPGSPA or designate to ensure proper completion. Any major issues or errors raised in the report will be addressed with the reviewers by the QA Office or AVPA/AVPGSPA, if appropriate. Any factual errors reported by the program are kept on file by the QA Office with the original report. In exceptional cases where a report does not provide value to the proposed program, a new review team may be sought, and a second site visit or desk review would supersede the original External Reviewers' Report.

The External Reviewers' Report is not public. Internally, the report is shared with the Vice-President Academic and Provost, AVPA or the AVPGSPA and Postdoctoral Affairs, Faculty Dean, Associate Deans Undergraduate or Graduate, AFIW Dean (if applicable), and the Chair/Director of the program.

Procedures for the External Evaluation

2.3.5 Program Response and Dean's Response

Separate responses from the program and the Dean are required. Representatives from the unit proposing the program review the External Reviewers' Report, write a response to each of the reviewers' recommendations, and outline plans for implementing the recommendations. The Proposal Brief is modified, as needed.

Once the QA Office receives the Program Response, it is shared with the relevant Faculty Dean and Affiliated and Federated Institutions of Waterloo (AFIW) Dean, if applicable. The Dean(s) are provided with a template to complete the Dean's Response, in which the Dean addresses the recommendations put forward by the external reviewers, and the program's response to the external reviewers' recommendations. The Dean's response should concentrate on those elements described in [QAF 2.1.1](#).

Procedures for the Program Response and Dean's Response

2.3.6 Institutional Approval

Major or significant changes to the Proposal Brief require that the proposal return through the initial approval process (i.e., Department/School, Provost, and Faculty-level approvals) prior to institutional approvals. The AVPA or AVPGSPA have final authority over whether re-approval is necessary. A new Financial Viability Assessment may also be necessary if substantive changes to resources or revenues have arisen.

The Proposal Brief (Volumes I and II), Program Response, and Dean's Response are submitted to Senate Undergraduate Council or Senate Graduate and Research Council and Senate for approval ([QAF 2.4](#)).

Procedures for Institutional Approval

2.3.7 Submission to & Response from Quality Council

Following Senate approval, the QA Office submits the Proposal Brief (Volume I), External Reviewers Report, Program Response, and Dean's Response, a brief commentary on the qualifications of faculty expertise and supervisory experience, and a submission checklist to the Quality Council Secretariat for approval by the Appraisal Committee ([QAF 2.5](#)).

Once the Quality Council Secretariat acknowledges receipt of the proposal, the program may begin to advertise the program to prospective students. However, any announcements or ads must contain the following statement ([QAF 2.7](#)):

"Prospective students are advised that offers of admission to a new program may be made only after the university's own quality assurance processes have been completed and the Ontario Universities Council on Quality Assurance has approved the program."

The Appraisal Committee evaluates the proposal based on ([QAF 2.6.2](#)):

- Overall sufficiency of the External Review Report(s);
- Recommendations and suggestions made by the external reviewers, including on the sufficiency and quality of the planned human, physical and financial resources;
- Adequacy of the internal responses by the unit and Dean(s) to the recommendations, or otherwise for single department Faculty; and
- Adequacy of the proposed methods for Assessment of Teaching and Learning given the proposed program's structure, objectives, program-level learning outcomes and assessment methods. ([See Evaluation Criteria 2.1.2.4 a\) and b\)](#))

The Appraisal Committee will then make a recommendation to the Quality Council. After considering the recommendation of the Appraisal Committee, the Quality Council will make one of the following decisions: ([QAF 2.7.2](#)):

- a) Approved to commence;

- b) Approved to commence, with report;
- c) Deferral for up to one year during which time the university may address identified issues and report back; or
- d) Not approved.

The Quality Assurance Secretariat will convey the decision of the Quality Council to the University. Then the QA Office notifies the program proponent/department/school of the Quality Council's official decision.

A decision of “approved to commence with report” is given when significant additional action, such as a large number of new hires and/or other new resources, are required to assure the quality of the program ([QAF 2.6.3](#)). The preparation of the report is the responsibility of the program, in consultation with the dean or deans of the faculties in which the required actions will be implemented. Approval of the report will be the responsibility of the Vice-President, Academic or their delegate. The QA Office will notify the program when their report is due and will review and submit it to the Quality Council on their behalf.

Universities may consult/appeal a decision of b), c), or d) from the Appraisal Committee within 30 days ([QAF 2.7.2](#)). Should the result of this reconsideration be unsatisfactory, the University can appeal the Appraisal Committee’s final recommendation to the Quality Council ([QAF 2.7.2](#)).

Programs will be notified by the Quality Assurance Office as to when they can begin to make offers of admission. Programs may only make offers of admission to new students once the Quality Council and the University have posted the approval of the new program and a brief description of the program on their websites.

After a new program is approved to commence, the program launches with its first student intake within 36 months of the date of approval ([QAF 2.9.1](#)) otherwise, the approval will lapse. The new program enters into the cyclical program review cycle, with the first review taking place no later than eight years following the first intake of students ([QAF 2.9.3](#)).

New undergraduate and/or graduate programs that have been approved within the period since the previous Audit are eligible for selection for the University’s next Cyclical Audit. Note: an audit cannot reverse the approval of a program to commence.

Procedures for Approval by Quality Council

2.3.8 Submission to & Response from the Ministry

Once the proposal has been submitted to the Quality Council, IAP submits a program proposal to the Ministry of Colleges and Universities (MCU) for approval of proposed tuition and grant weight. Once MCU approval is confirmed, IAP notifies the department/school and applicable university personnel.

2.3.9 Progress Report

A Progress Report is prepared by the program's Chair or Director, submitted to the QA Office and reviewed and approved by the AVPA or AVPGSPA. The submission deadline for the Progress Report is determined on a case-by-case basis but is required no later than 48 months after the program's first student intake. This report satisfies the QAF requirement to ensure the monitoring of new programs ([QAF 2.9.2](#)). The purpose of the report is to provide initial data on student progress and implementation of the program, to respond to recommendations and any issues raised in the External Reviewers' Report, and to highlight any additional areas to be considered in the first cyclical review of the new program. In addition, this report will carefully evaluate the program's success in realizing its objectives, requirements, and outcomes, as originally proposed and approved, and any changes that have occurred in the interim, including in response to any Note(s) from the Appraisal Committee.

The Progress Report is internally reviewed and approved by Senate Undergraduate Council or Senate Graduate and Research Council, and subsequently sent to Senate for information. This report is not subject to Quality Council reporting, unless the program received 'approval to commence, with report' ([QAF 2.6.3](#)).

Procedures for the Progress Report

3. EXPEDITED APPROVALS OF NEW PROGRAMS

Proposals for new for-credit Type 2 and 3 graduate diplomas (GDip), as well as, new standalone degree programs arising from a long-standing field in a master's or doctoral program that has undergone at least two Cyclical Program Reviews and has at least two graduating cohorts, follow an expedited approval process ([QAF 3](#)).

These proposals have the same required steps as a New Program Proposal with the exception of the external evaluation and subsequent responses. New graduate diplomas are required to submit a Proposal Brief that addresses the relevant QAF Evaluation Criteria ([QAF 2.1.2](#)).

The Quality Council's Appraisal Committee conducts an appraisal and will then make a recommendation to the Quality Council. After considering the recommendation of the Appraisal Committee, the Quality Council will make one of the following decisions: ([QAF 3.2](#)):

- a) Approved to commence;
- b) Approved to commence, with report;
- c) Not approved.

The Quality Assurance Secretariat will convey the decision of the Appraisal Committee to the Quality Council for information, and then to the University. The QA Office notifies the program proponent of the Quality Council's official decision ([QAF 3.2](#)).

A decision of "approved to commence with report" will only be required when significant additional action, such as a large number of new hires and/or other new resources, are required to assure the quality of the program ([QAF 2.6.3](#)). The QA Office will notify the program when their report is due and will review and submit it to the Quality Council on their behalf.

The University may appeal a decision of b) or c) using the same process for new program appeals in the [QAF 2.7.1 to 2.7.4](#).

The expedited approval process *may* also be used if the institution requests Quality Council endorsement of a graduate field, or if the institution requests an expedited approval for a major modification to an existing program. However, Waterloo has rarely used this process for graduate fields or major modifications. Note: programs created or modified through the Protocol for Expedited Approvals are not normally subject to the institution's Cyclical Audit.

An approved GDip should be added to the Cyclical Program Review Schedule, for review alongside its "parent" program, where one exists. In the absence of an existing "parent" master's or doctoral degree program, best practice would be to have the proposed GDip externally reviewed by desk review or equivalent method.

[Flow chart of QAF Overview of the Expedited Approval Process](#)

Procedures for Expedited Approvals of New Programs

3.1 Proposals for New Undergraduate Minors, Options, Specializations, Certificates and Diplomas

Proposals for a new for-credit undergraduate minors, options, specializations, certificates, or diplomas require, at minimum, Faculty-level approval, Senate Undergraduate Council and Senate approval ([Appendix A](#)).

New for-credit undergraduate diplomas are considered major modifications and are subject to the approval process for major modifications (see [Section 4](#)). Proposals for new for-credit undergraduate diplomas may be subject to approval by the Ministry of Colleges and Universities for tuition and grant funding. Please consult Institutional Analysis and Planning.

Not-for-credit and for-credit undergraduate or post-graduate diploma programs are not subject to approval or audit by the Quality Council.

4. MAJOR MODIFICATIONS TO EXISTING PROGRAMS

4.1 Definition of a Major Modification

Major modifications are made by institutions in order to ([QAF 4](#)):

- Implement the outcomes of a cyclical program review;
- Reflect the ongoing evolution of the discipline;
- Accommodate new developments in a particular field;
- Facilitate improvements in teaching and learning strategies;
- Respond to the changing needs of students, society, and industry; and/or
- Respond to improvements in technology.

Such modifications provide an opportunity for continuous improvement, improving the student experience and staying current with the discipline.

According to the QAF, the purpose of identifying major modification to existing programs is to ensure “their approval through a robust quality assurance process” and to “assure stakeholders, including the university, students, the public, and the government of the ongoing quality of the institution’s academic programs.”¹²

A [major modification](#) is defined as one or more of the following program changes ([QAF 4](#)):

- Requirements that differ significantly from those existing at the time of the previous cyclical program review;
- Significant changes to the program-level learning outcomes that do not, however, meet the threshold of a new program;
- Significant changes to the program’s delivery, including to the program’s faculty and/or to the essential physical resources as may occur, for example, where there have been changes to the existing mode(s) of delivery (e.g., different campus and/or online/hybrid delivery – see below);
- Change in program name and/or degree nomenclature, when this results in a change in learning outcomes; and/or
- Addition of a single new field to an existing graduate program. Note that universities are not required to declare fields for either master’s or doctoral programs. Also note that the creation of more than one field at one point in time or over subsequent years may need to go through the Expedited Protocol.

¹² [Quality Assurance Framework \(oucqa.ca\)](#) (2021)

Waterloo defines a *significant change* as revisions or additions (i.e., major modifications) that substantially impact a program. For example, changing *up to* one third of the courses or requirements to a program. Changes that impact *more* than a third of courses or requirements may be considered a new program. The AVPA or AVPSGA will make the decision as to whether the changes constitute a new program, requiring the initiation of the new program protocol.

When changing the mode of delivery of a program to online for all or a significant portion of a program that was previously delivered in-person, consider the following criteria:

- Maintenance of and/or changes to the program objectives and program-level learning outcomes;
- Adequacy of the technological platform and tools;
- Sufficiency of support services and training for teaching staff;
- Sufficiency and type of support for students in the new learning environment; and
- Access.

All major modifications to existing programs require internal approvals. Changes that impact collaborations with other courses, programs, departments/schools and Faculties require consultation in advance of bringing the change forward for approval. IAP must be consulted as some major modifications can impact tuition and grant funding from the Ministry.

In addition, academic support units such as Centre for Teaching Excellence (CTE), Co-operative and Experiential Education (CEE), and the Library must be consulted to assess any impact of the proposed changes.

Furthermore, an assessment of the impact of the proposed modification will have on the program's students, and input from current students and recent graduates of the program must be included in the documented rationale for the major modification. Specifically, including a statement on the way in which the proposed major modification will improve the student experience.

In such cases where a submission of a major modification to the Quality Council is for expedited approval, the submitted Proposal requires:

- Description of, and rationale for, the proposed changes; and
- Application of the relevant criteria, as outlined in Framework Section [2.1.2](#), to the proposed changes. The University will determine which criteria are deemed relevant for each Proposal and, to meet their own needs and in recognition of the diversity in institutional strategies, institutions may include their own quality assurance requirements, including for example, consideration of equity, diversity and inclusion, special missions and mandates, and student populations that are being encouraged by governments, institutions, and others.

Any program closure will be considered a major modification and will follow the approval process listed below. The internal approval process will ensure that the proposed modification is in alignment with the relevant program-level learning outcomes.

Major modifications are approved initially at the department/school level and Faculty level (including relevant Faculty Undergraduate or Graduate Committee, and Faculty Council). Subsequently, the major modification is approved at Senate Undergraduate Council or Senate Graduate and Research Council and, finally, by Senate. Major modifications are not subject to Quality Council approval; however, all major modifications are submitted and subject to review by the Quality Council on an annual basis ([QAF 4.3](#)). The Quality Council has the final authority to decide if a major modification constitutes a new program and, therefore, must follow the Protocol for New Program Approvals. Note: major modifications are not normally subject to the institution's Cyclical Audit.

Level of approval and reporting for major modifications is listed in [Appendix A](#).

If there is uncertainty as to whether a particular change is major/significant or minor, the program should contact the [QA Office](#). The AVPA or AVPGSPA will be the final arbiter for decisions with regards to major modifications for undergraduate and graduate programs, respectively.

Procedures for Major Modifications

4.2 Minor Modifications

Modifications that do not meet the threshold of a major modification are considered to be minor. These would minimally include: changes to an existing Emphasis, Option, or Minor Program; the creation of a new micro-credential(s); undergraduate certificate(s); and laddering, stacking or similar options or comparable elements. While these modifications do not need Quality Council appraisal and approval, the QC requires that the University of Waterloo detail how the changes will be made and the quality of such changes will be assured.

Minor modifications to academic programs for credit (e.g., Emphasis, Specialization, Option, or Minor, undergraduate certificate(s) or comparable elements) are approved at the department/school level, Faculty level (including relevant Faculty Undergraduate or Graduate Committee, and Faculty Council), and then subsequently approved at Senate Undergraduate Council or Senate Graduate and Research Council. Undergraduate Council or Senate Graduate and Research Council are empowered to approve minor changes on behalf of Senate, as per [Senate Bylaw 2](#).

Minor modifications for non-credit or alternative credentials offerings such as micro-credential(s), laddering, stacking or similar options, or comparable elements, are approved by an [Alternative Credentials Approval Committee](#) which is chaired by the AVPA. New offerings are submitted to this Committee for review and approval using a standardized template. The template requires that the offerings detail how they will solicit feedback from participants and provide a timeframe for ongoing evaluation. The Committee will review the report to assess indicators of

the quality of the offering and will recommend steps taken to address any problems that are identified.

Minor modifications are not subject to Quality Council review or reporting. Level of approval and reporting for minor modifications is listed in [Appendix A](#).

Procedures for Minor Modifications



5. CYCLICAL REVIEWS OF EXISTING PROGRAMS

5.1 Purpose of Cyclical Reviews

Cyclical reviews of academic programs are conducted to:

- help each program achieve and maintain the highest possible standards of academic excellence, through systematically reflecting on its strengths and weaknesses, and look forward to determine what actions would further enhance quality in the program;
- assess the quality of the program relative to counterpart programs in Ontario, Canada and internationally;
- meet public accountability expectations through a credible, transparent, and action-oriented review process;
- create an institutional culture that values continuous improvement, while recognizing the significant workload implications such proactive steps require.

A key outcome from a Cyclical Review is the Final Assessment Report which forms the basis of a continuous improvement process that monitors the recommendations in the Implementation Plan.

Given its commitment to continuous improvement and excellence in academic programs, the University of Waterloo also reviews undergraduate diplomas, minors, options, and specializations, which exceeds the requirements of the QAF. Offerings such as participation certifications and language diplomas are excluded from a cyclical review.

Academic programs are typically, but not always, associated with an academic department. In cases where program administration spans multiple academic units, provisions are made to review these offerings (joint programs and multi- or inter-disciplinary programs) in a way that is appropriate for the University. Faculty-based programs – those administered through the Faculty Dean’s Office – follow the same process as their counterparts housed in traditional academic departments/schools.

Waterloo encourages combined or ‘augmented’ reviews (i.e., where related undergraduate and graduate are reviewed concurrently) where feasible as such reviews tend to be more efficient. More importantly, augmented reviews often have academic merit, as there are typically interactions between the undergraduate and graduate programs, so benefits of the program review process are greater when the programs are considered together.

Note: regardless of the “bundling” of program reviews, the quality of each academic program and the learning environment of the students in each program will be explicitly addressed in the self-study and the external reviewers’ report.

5.2 Frequency of Reviews

Waterloo’s cyclical program reviews are generally scheduled to take place every seven years.

According to the QAF, program reviews must be reviewed in a cycle not to exceed eight years ([QAF 5.1.1](#)). To achieve alignment between the timing of reviews of undergraduate and graduate programs, the scheduling of the review can be adjusted, with approval from the AVPA or AVPGSPA, but the interval between reviews shall not exceed eight years. Failure to complete the review within the eight-year timeline would put the University of Waterloo out of compliance with the QAF. Every effort is made at all levels of the University to adhere to the QAF timelines.

The program [review schedule](#) is posted on the Academic Program Review website and is updated annually. **Note:** programs which have been closed or for which admission has been suspended are out of scope. The review schedule includes all program offerings, including those that are joint/inter-institutional, multi-disciplinary, interdisciplinary or at multiple sites. The Schedule will also include all modes of program delivery and can reflect independent or concurrent review of a university's undergraduate and graduate programs, and/or with other departments and academic units.

[Flow chart of QAF Overview of Cyclical Program Review Process](#)

5.3 Cyclical Program Review Process

The cyclical review process typically takes up to 18 months to complete. There are five components to complete the cyclical program review, as outlined in the QAF:

1. The **self-study** ([QAF 5.1.3](#)) is prepared by faculty and staff with input from faculty, students and alumni of the program. Professional programs must also seek feedback from employers and/or professional associations. ([Procedures](#));
2. An **external evaluation** ([QAF 5.2.1](#)), including a site visit¹³, is conducted by qualified, [arm's length](#) reviewers, who submit a report on their findings ([Procedures](#));
3. The **Program Response, Implementation Plan & Dean's Response** ([QAF 5.3.2](#)) are submitted, summarizing the response to the External Reviewers' Report and plans for implementing the recommendations ([Procedures](#));
4. A **Final Assessment Report (FAR)** ([QAF 5.3.2](#)), which is a synopsis of the self-study, reviewers' recommendations, Program and Dean's Responses, and the Implementation Plan, is prepared by the QA Office ([Procedures](#));
5. **Approval and Reporting** ([QAF 5.4.1](#), [5.4.2](#)) requires that the FAR is reviewed by the AVPA or AVPGSPA, then the Program Chair or Director and the Dean for factual corrections. The FAR is then reviewed and approved by [Senate Undergraduate Council](#) or [Senate Graduate and Research Council](#) ([note: these bodies have delegated authority to approve such items on behalf of Senate](#)), and then sent to [Senate](#) for information. Upon Senate approval, the FAR is sent to the Program Chair or Director, Dean and Associate Dean and is posted publicly on the University's website. The FARs are submitted annually to the Quality Council ([Procedures](#))

In order to ensure that the full quality improvement value of the cyclical review process is

¹³ All programs will include an in-person site visit, where permissible by public health guidelines.

attained, the University of Waterloo has monitoring and reporting steps as required in the [QAF 5.4.1](#):

6. The **Progress Report** provides an update on progress made on the Implementation Plan. The Report is reviewed and approved by Senate Undergraduate Council or Senate Graduate and Research Council, as appropriate, then sent to Senate for information, whereupon it is posted on the University's website. This report is not subject to QC reporting (**Procedures**);

Detailed procedures for cyclical program reviews (steps 1-7) are hyperlinked outside of the IQAP as they are subject to slight changes (i.e., changes in timelines or revisions to the names of institutions or positions, etc.); however, all procedures adhere to the standards outlined within the QAF. Any substantial changes made to these procedures requires the approval of Senate and the Quality Council. Note: Editorial changes, changes to deadlines, and similar minor changes are not subject to such approval.

The QA Office maintains the [Academic Program Reviews website](#) which includes resources for those involved in any stage of the cyclical review process, including comprehensive templates for the self-study (Volume I, II, III), External Reviewers' Report, Program Response and Implementation Plan, Dean's Response, and Final Assessment Report (FAR), as well as the Two-Year and Five-Year Progress Reports. Programs are encouraged to contact the [QA Office](#) at any time for further clarification on matters pertaining to their cyclical program review.

5.3.1 Self-Study

As per Waterloo's [schedule of cyclical program reviews](#), the QA Office, on behalf of the AVPA or AVPGSPA, notifies the Chair/Director of the program of the upcoming review approximately a year in advance of the deadline for submission of the self-study. The programs and any associated "bundling" of programs are denoted in the program review schedule and distinct versions of each program must be identified at the beginning of the process, including the various delivery modes and sites.

An orientation presentation is organized by the QA Office, which covers the nature of the review process, an overview of the self-study template and the associated timelines. The preparation of the self-study, consisting of three volumes of documentation (Volume I, II, III), has typically required 8-10 months. This duration is a result of the need for meaningful consultation with stakeholders including faculty, students, staff and alumni, **as** well as feedback on professional programs from employers and/or professional associations; receipt of partners' contributions (e.g., cooperative education, library, and others); the gathering of faculty data including access to up-to-date CVs; and the allocation of time for program leaders to engage in a broad-based, reflective, forward-looking and critical analysis.

Each program receives a self-study (Volume I) template pre-populated with numerical data relevant to their program(s). These data quantify critical program attributes – student demand, enrollments, and retention; faculty teaching and students' perceptions of quality; research output and funding; and composition of the program's faculty and staff. The intention of providing these data is to allow

the program to interpret the quantitative representation in ways that advance the goals of the review – identifying strengths and opportunities for enhancement.

Data for the self-study are provided primarily by IAP, reflecting centrally compiled institutional data, and ensuring consistency and integrity in definitions, sources and dates. These data are for internal uses and not publicly available. In cases where programs have concerns with the data that are provided, opportunities exist in the self-study process to verify the validity of these data with IAP, the QA Office, and other sources.

The cyclical review covers the seven previous fiscal years (spring/fall/winter), with emphasis on the most recent years.

The structure and content of the self-study follow the requirements of the QAF ([QAF 5.1.3.](#)). Programs and ultimately external reviewers are required to articulate and evaluate:

- consistency of the program’s learning outcomes with the institution’s mission and Degree Level Expectations, and how graduates achieve those outcomes;
- program-related data and measures of performance, including applicable provincial, national and professional standards (where available);
- integrity of the data;
- [evaluation criteria and quality indicators \(QAF 5.1.3.1\)](#);
- Identify any unique curriculum or program innovations, creative components, or significant high impact practices;
- concerns and recommendations raised in previous reviews (including items flagged for monitoring or follow-up with the QC for new programs undergoing their first cyclical review);
- areas identified through the self-study as requiring improvement;
- areas identified as holding potential for enhancement and/or opportunities for curricular change as identified by the program’s faculty, staff and/or students;
- academic services that directly contribute to the academic quality of each program under review;
- participation of program faculty,¹⁴ staff, students, and alumni in the self-study

The completed self-study is subject to review and approval of the AVPA, AVPGSPA or designate.

All documentation associated with the self-study is confidential and not publicly available.

Procedures for Completing the Self-Study

5.3.2 External Evaluation

The QAF specifies that the review of existing programs should be assessed by external academic reviewers guided by [QAF 5.2](#) using the QAF’s evaluation criteria in [QAF 5.1.3.1](#). The Review

¹⁴ Faculty who regularly teach in the program, and faculty from the Affiliated and Federated Institutions of Waterloo (AFIW) are to be consulted.

Committee consists of two external reviewers who are [arm's length](#) from the program under review, one from inside and one from outside the Province of Ontario, and an internal support person, as needed, from within the institution, but outside the program/discipline.

External reviewers will be selected on following criteria ([QAF 5.2.1](#)):

- normally associate or full professors, or the equivalent—will have suitable disciplinary expertise,
- qualifications and program management experience, including an appreciation of pedagogy and learning outcomes

External reviewers ([including](#) employers and/or professional associations related to professional programs) are nominated by the program in Volume III. From the full list of nominees, the Review Committee (also known as the Site Visit Team) will be selected, as appropriate, by the AVPA, AVPGSPA or designate. The criteria for selection of the reviewers include at minimum associate or full professor level, previous administrative leadership, evidence of current research and teaching, and similarity of the externals' academic discipline to the program(s) being reviewed. External reviewers for professional programs will be selected based on length and quality of expertise in industry or profession as well as current level of activity in the field.

The Review Committee will evaluate the program by reading the self-study and Volume II (CVs) and conducting a site visit. [During](#) the site visit, the AVPA, AVPGSPA or designate ensure the reviewers understand their role and respect the confidentiality of the review process. During the site visit, the reviewers meet with faculty, staff, students, and administrators connected to the program(s) under review and view related facilities.

The reviewers are provided with an [External Reviewers' Report template](#) that includes the criteria outlined in the [QAF 5.2.1](#). Reviewers are instructed to present their findings from the site visit in one joint report using the External Reviewers' template and submit it to the QA Office. Reviewers are asked to identify and commend the notably strong and creative attributes of each discrete program documented in the self-study, as well as, each discrete program's respective strengths, areas for improvement, and opportunities for enhancement. In addition, reviewers are asked to provide evidence of any significant innovation or creativity in the content and/or delivery of the program relative to other such programs. [This](#) report must include a minimum of three recommendations for specific steps to be taken that will lead to the continuous improvement of the program, distinguishing between those the program can itself take and those that require external action. [Reviewers](#) must articulate and demonstrate the value of any suggested additional resources, such as faculty complement and/or space requirements, and how these are directly tied to issues of program quality or sustainability. The QA Office requests to receive this report within two weeks of the site visit.

Once received, the report is reviewed by the QA Office and AVPA, AVPGSPA or designate to ensure proper completion. Any major issues or errors identified in this review are addressed with the reviewers by the QA Office, and AVPA or AVPGSPA, if appropriate. Any factual errors reported by the

program are kept on file by the QA Office with the original report. In the unlikely case where a report does not provide sufficient value to the program under review, a new Review Committee may be sought, and a second site visit or desk review conducted which would supersede the original External Reviewers' Report.

The External Reviewers' Report is not publicly available. The document is shared internally with the Vice-President Academic and Provost, AVPA or AVPGSPA, Faculty Dean(s), Associate Deans Undergraduate or Graduate, AFIW Dean (if applicable), and the Chair/Director of the program.

Procedures for the External Evaluation

5.3.3 Program Response, Implementation Plan and Dean's Response

Representatives from the program, typically those responsible for the development of the self-study, review the External Reviewers' Report and write a response to each of the reviewers' recommendations using a template provided by the QA Office. The program also drafts a plan for the implementation of the recommendations and prioritizes recommendations selected for action. Once the QA Office receives the Program Response and Implementation Plan, the documents are shared with the relevant Faculty Dean(s) and, if applicable, AFIW Dean. The Dean(s) is provided with a template to complete the Dean's Response.

In their response, the Dean reflects upon the actions the program proposed in their self-study report, the recommendations put forward by the external reviewers, and the program's response to the external reviewers' recommendations and their Implementation Plan. The Dean is asked to comment specifically on the consistency and alignment of the program's intended actions with Faculty- and University-level priorities. Moreover, the Dean addresses any Faculty resource implications that may be necessary for the program to respond effectively to the recommendations.

Naturally (and appropriately), there may be instances where the program's and Dean's assessments of future pathways may not be entirely aligned. In such cases, these stakeholders are encouraged to address any differences. Collectively, the Program Response and the Dean's Response should provide clarity to the program, the Faculty, and the University on:

- what actions will follow from specific recommendations and prioritizes recommendations selected for action;
- any changes in organization, policy or governance that would be necessary to follow the recommendations;
- resources – financial or otherwise – required to support the implementation of selected recommendations;
- who will be responsible for providing resources;
- a proposed timeline and responsibility for oversight for implementation of any of those recommendations; and
- priorities for implementation and realistic timelines for initiating and monitoring actions.

The details, most of which are verbatim, from the Program Response, Implementation Plan, and Dean's Response are used by the QA Office to prepare the Final Assessment Report (FAR); however, the Program Response and Dean's Response documents are not publicly available.

Procedures for Completing the Program Response, Implementation Plan and Dean's Response

5.3.4 Final Assessment Report

The Final Assessment Report (FAR) is the key outcome of a cyclical review and forms the basis of a continuous improvement process that monitors the recommendations in the Implementation Plan. The QA Office prepares the FAR and it is reviewed by the AVPA or AVPGSPA. The FAR is a synopsis of the entire cyclical review and is based on information extracted, in many cases verbatim, from the self-study, External Reviewers' Report, Program Response and Dean's Response. The FAR identifies strengths of the program, opportunities for program enhancement, and sets out an implementation plan for all of the external reviewer's recommendations (except, where an approved rationale is provided for not including a specific recommendation(s)). Furthermore, any additional recommendations that the program/unit, the Dean(s) and/or the University may have identified as requiring action as a result of the program's review will be included in the FAR.

The FAR includes an Executive Summary, and Implementation Plan, which outlines who is responsible for providing resources for the recommendations, who is responsible for acting on the recommendations, and timelines for acting on and monitoring the implementation of the recommendations ([QAF 5.3.2](#)). The Final Assessment Report will not include any confidential information.

Procedures for Completing the Final Assessment Report (FAR)

5.3.5 Approval and Reporting

After the FAR and associated Implementation Plan are reviewed by the AVPA or AVPGSPA, they are shared with the Program Chair or Director and the Dean for review of any factual corrections. Before they go to Senate for information they are reviewed and approved by members of Senate Undergraduate Council or Senate Graduate and Research Council ([note: these bodies have delegated authority to approve such items on behalf of Senate](#)). Once through Senate, they are sent to the Program Chair or Director for them to "own" and act on, as appropriate, and are posted publicly on the [Academic Program Reviews](#) website and the website of any affiliated institution. Programs are also encouraged to post the FAR and associated Implementation Plan on their own websites. The FARs, including the Implementation Plans, are submitted annually to the Quality Council and to the Board of Governors. The annual report and related Cyclical Program Review processes will occasionally be reviewed for compliance by the Quality Council and, if issues are found, the Quality Council may decide to initiate a Focused Audit (see [Section 6](#)).

Procedures for Approval and Reporting

5.3.6 Progress Report

The Program Chair or Director is responsible for the preparation and submission of a Progress Report, submitted approximately four years after the start of each cyclical review. In this report, programs are asked to outline their progress on their Implementation Plan from their last program review. This report is an opportunity for the program to explain any circumstances that have altered the original implementation plan, address any significant developments or initiatives that have arisen since the program review process or that were not contemplated during the review, and report on anything else the Program Chair or Director believes is appropriate to bring to Senate concerning the program.

The progress report is reviewed by the AVPA or AVPGSPA, and subsequently approved by Senate Undergraduate Council or Senate Graduate and Research Council. Finally, the progress report is sent to Senate for information and posted publicly on the [Academic Program Reviews](#) website.

Procedures for Completing the Progress Report

5.4 Programs at Federated or Affiliated Institutions

The University of Waterloo has one federated university (St. Jerome's University) and three affiliated university colleges (Conrad Grebel University College, Renison University College, United College). All academic programs offered completely by, or in conjunction with, these Affiliated and Federated Institutions of Waterloo (AFIW) fall under the purview of the University of Waterloo's IQAP and follow the same quality assurance process and standards as other programs offered by the University of Waterloo. When a program is primarily based within one of the AFIW, the lead role for the program review is taken by the relevant institution.

For a number of Waterloo programs, a substantial contribution is made to program delivery by one or more of the AFIW, and in a few cases there is a parallel unit to the Waterloo department primarily responsible for the delivery of the program. Success in such situations is facilitated by active cooperation and communication between the units involved, and it is expected that such units will use the review process as an opportunity to explore ways in which the program(s) under review can be strengthened. In such cases the following principles should apply:

- the Waterloo department in which the program is housed will be primarily responsible for preparation of the self-study, for hosting site visitors, and for responding to recommendations;
- the self-study should accurately reflect the role of the AFIW in the delivery of the program;
- the Waterloo unit is responsible for ensuring that there is meaningful consultation with the AFIW units (or where there is no unit, colleagues who are involved in the delivery of the program to a considerable degree) during the preparation of the self-study and the response to recommendations;

- in cases where implementing recommendations may require changes to processes and practices not only with the Waterloo units but within the AFIW as well, program and Deans' responses to the recommendations should clearly indicate what steps will be taken in each institution. If a recommendation is to be acted on in one unit but not another, a rationale should be provided.

Conversely, for programs whose delivery is primarily the responsibility of a unit within one or more AFIW, appropriate involvement of relevant Waterloo departments or colleagues in the preparation of self-studies and response to recommendations is required.

The Affiliated and Federated Institutions of Waterloo may opt to have their program reviews considered at their own councils, in parallel to their review and approval at Senate Undergraduate Council or Senate Graduate and Research Council. The [Final Assessment Reports \(FARs\)](#) and [Progress Reports](#) for AFIW-based programs will be centrally posted on the Academic Program Reviews website as well as on the AFIW's own website.

5.5 Programs Joint with other Universities

The University of Waterloo partners with a number of other institutions to offer a variety of joint programs at both the undergraduate and graduate level; these joint programs result in the conferring of a single degree. Excluded from the notion of 'joint' in this context are collaborative programs connected solely at the administrative level in order to assist students to earn mutually independent degrees from each of the partner institutions (e.g., a double degree program - Bachelor of Business Administration from Wilfrid Laurier University and Bachelor of Computer Science from University of Waterloo).

Procedures for joint programs with other universities

In the case of joint programs with other postsecondary institutions in Ontario, the participating institutions will agree on a common review schedule. Cyclical reviews will be conducted according to the IQAP of the institution administering the review (usually the institution at which the current director holds appointment) and under the leadership of that institution's program director. For purposes of consistency, the institution that holds directorship of the joint program at the beginning of the cyclical review will be responsible for leading the process through to the completion of the Final Assessment Report, Implementation Plan, and the Progress Report.

For programs joint with universities outside Ontario, the quality of the program is subject to quality assurance processes in the respective jurisdictions; therefore, the review process must adhere to the procedures outlined in the QAF. It is the responsibility of the Quality Council to determine whether the out-of-province partner is subject to an appropriate quality review process in its own jurisdiction suitably comparable to the Quality Council's assurance processes. Waterloo includes information in the self-study relevant to the out-of-province offering. The review may not necessarily require a site visit to the other institution; however, the program includes information that would normally be gained during a site visit about the components of

the program completed outside Ontario (e.g., video, photos, floor plans, etc.).

5.6 Accredited Programs

Beyond the Quality Assurance process, many academic programs are evaluated and accredited by organizations in their disciplines. Examples at the University of Waterloo include Engineering programs that are accredited by [CEAB](#) while the School of Planning is accredited at the Provincial and Federal levels. It is important to understand the similarities and differences between accreditation processes and the Institutional Quality Assurance Process.

According to the Quality Council, accreditation is described as “a process by which a program or institution is evaluated to determine if it meets certain pre-determined minimal criteria or standards.” Quality assurance, on the other hand, is described as “as on-going and continuous evaluation for the purpose of quality improvement. Quality assurance processes include assessing, monitoring, guaranteeing, maintaining and improving.”¹⁵ Inherently, accreditation typically asks if a program is meeting the minimum requirements to ensure graduates have necessary attributes to engage professionally. The IQAP process, as articulated throughout this document, concentrates on continuous improvement with systematic, transparent monitoring by (internal) stakeholders.

Despite the differences in objectives, these two processes have overlapping elements. To support programs that have accreditation requirements, the University’s IQAP, at the discretion of the AVPA or AVPGSPA may:

- allow programs’ timelines for Quality Assurance to be modified to coincide with accreditation, provided that timeline does not exceed the maximum interval between cyclical reviews;
- allow external site visits by accreditation and program reviewers to occur concurrently; and
- allow content (data, analyses, or evaluations) developed for accreditation processes to be used for Quality Assurance when the accreditation materials directly satisfy the IQAP requirements.

The Associate Vice Presidents and the QA Office encourage open and frank conversations with programs about the opportunities to reduce workloads while still maintaining the integrity of the Quality Assurance process.

In the event that the Associate Vice Presidents allow elements of a cyclical program review to be substituted or augmented with elements from an accreditation review, a record of each substitution or addition will be kept as well as a record of the AVP’s decision making ([QAF 5.5](#)). A Record of Substitution or Addition, and the grounds on which decisions were made, is eligible for

¹⁵ [5.5 Use of Accreditation and Other External Reviews in the Institutional Quality Assurance Process — Ontario Universities Council on Quality Assurance \(oucqa.ca\)](#)

Cyclical Audit by the QC.



6. AUDIT PROCESS

The Quality Council will audit each university once every eight years. An audit provides necessary accountability to post-secondary education's principal stakeholders ([QAF 6](#)). As the QAF states,

“the objectives of the Cyclical Audit...are to ensure transparency and accountability in the development and review of academic programs, to assure students, citizens and the government of the international standards of quality assurance processes, and to monitor the degree to which a university has:

- a) *Improved/enhanced its quality assurance processes and practices;*
- b) *Created an ethos of continuous improvement; and*
- c) *Developed a culture that supports program-level learning outcomes and student-centred learning.”¹⁶*

Cyclical Program Reviews that were undertaken within the period between audits and any new undergraduate and/or graduate programs that have been approved since the previous audit are eligible for selection for the university's next Cyclical Audit. Note that an audit cannot reverse the approval of a program to commence.

The University is required to complete the following:

- participate in a half-day briefing with the Quality Council Secretariat and an Audit Team member approximately one-year prior to the scheduled Cyclical Audit;
- prepare an institutional self-study;
- describe the process for the preparation of the institutional self-study;
- assign responsibility for the preparation of the self-study and submission of the self-study and desk audit documentation to the Quality Council Secretariat;
- establish the schedule for the site visit so that the audit team meet with all the stakeholders (listed in [QAF 6.2.6](#));
- submit a report on the factual accuracy of the audit report draft;
- if necessary, submit a follow-up report frame with details about how the issues have been addressed;
- if necessary, make changes in the follow-up report;
- if required, participate in a focused audit and act accordingly;
- publish the Audit Report, absent any confidential information, on its website;
- publish the Follow-up Response Report, as well as the associated auditors' report on its website; and
- publish any Focused Audit Report on its website.
- The AVPA and AVPGSPA, with support from the QA Office, are jointly responsible for drafting the institutional self-study. The following academic support units that are involved in new programs, cyclical reviews, and major modifications, will be asked for

¹⁶ [Quality Assurance Framework \(oucqa.ca\)](#) (2021)

their input into the self-study: Institutional Analysis and Planning (IAP), Graduate Studies and Postdoctoral Affairs Office, Centre for Teaching Excellence, Centre for Extended Learning, Registrar's Office, Marketing and Undergraduate Recruitment, Co-op and Experiential Education, the Library, EDI-R and the Indigenous Relations Office and others as needed.

A lack of compliance with concerns raised from an audit can result in the Quality Council suspending enrolment in a particular program(s) or delaying or suspending new program approvals ([Part One: QAF Principles](#)). In addition, the University of Waterloo may be required to participate in a subsequent Focused Audit ([QAF 6.3](#)) when the Quality Council has some concerns about the quality assurance processes at the University.

Appendix A: Sequence of Approval and Reporting

| IQAP Item | Faculty-Level | Externally Reviewed | SUC*/SGRC*/ACAC* | Senate | Quality Council | Ministry |
|---|------------------|---------------------|------------------|-------------|---|---|
| Cyclical Program Reviews | | | | | | |
| Final Assessment Report (FAR) | Dean's Signature | Yes | Approval | Information | Information | N/A |
| Progress Report | Dean's Signature | No | Approval | Information | No | N/A |
| New Program Proposals | | | | | | |
| Undergraduate Major | Approval | Yes, if 'brand-new' | Approval | Approval | Yes, if 'brand-new' | Yes, in non-core areas ¹⁷ |
| Undergraduate Degree | Approval | Yes | Approval | Approval | Approval | Yes, in non-core areas ¹⁷ |
| Type 2 & 3 Graduate Diploma | Approval | No | Approval | Approval | Approval | Yes, if Type 3 GDip |
| Graduate Degree | Approval | Yes | Approval | Approval | Approval | Yes |
| Progress Report for new programs | Dean's Signature | No | Approval | Information | Yes, if 'approved to commence, with report' | No |
| Major Modifications | | | | | | |
| Major Modification to Existing Program | Approval | No | Approval | Approval | Information | Information |
| Minor Modification to Existing Program | Approval | No | Approval | No | No | No |
| New minor modification, non-credit (e.g., micro-credentials, badges etc.) | No | No | ACAC Approval | No | No | Yes- if OSAP eligible |
| New Undergraduate Diploma, Minor, Option, or Certificate | Approval | No | Approval | Approval | Information | Information, except UG Diplomas in non-core areas ¹⁷ |
| Graduate Field | Approval | No | Approval | Approval | Information | No |
| Graduate Specialization, Type 1 GDip | Approval | No | Approval | Approval | Information | No |
| Graduate Collaborative Program | Approval | No | Approval | Approval | Information | Yes– if tuition or grant funding is impacted |

*As delegated by Senate

¹⁷ Consult Institutional Analysis and Planning (IAP) for Ministry core/non-core areas.

