UNIVERSITY OF WATERLOO SENATE GRADUATE & RESEARCH COUNCIL NOTICE OF MEETING

Chair – J. Casello

Monday 12 June 2023

10:30 a.m. – 12:00 noon

DATE:

TIME:

PLACE: NH 3318/3308	
AGENDA	:-
Item Declarations of Conflict of Interest	Action
a. Excerpt from Bylaw 1, section 8*	Information
CONSENT AGENDA	
Motion: To approve or receive for information by consent, items 1-4 below	
1. Minutes of 8 May 2023*	Decision (SGRC)
2. Research Ethics* (Joza)	
a. Research Ethics Board – membership extensions	Decision (SGRC)
 3. Graduate Awards* (Simm) a. Faculty of Environment Graduate Student Research Dissemination Award (operating) b. Professor Safieddin (Ali) Safavi-Naeini Graduate Scholarship (endowment) c. Department of Philosophy Congress Graduate Award (trust) d. Science Graduate Award (operating) e. Buitrago Opportunity Graduate Scholarship in Engineering (trust) 	Decision (SGRC) Decision (SGRC) Decision (SGRC) Information Information
4. Curricular Submissionsa. Environment* (Peter Deadman)	Decision (SGRC)
REGULAR AGENDA	
5. Business Arising from the Minutes	Information
6. Co-chairs' Remarks	Information
7. Extensions for Centres and Institutes* (Charmaine Dean)	Decision (SGRC)
8. Curricular Submissions	
a. Arts* (Anna Esselment)	Item D, SEN-regular
b. Engineering* (Siva Sivoththaman)	Items 2a+b, SEN-regular
	Rest of items under 8a+b Decision (SGRC)
9. Graduate Studies & Postdoctoral Affairs - Class Delivery Modes* (Marianne Simm)	SEN-Regular
10. Graduate Studies Academic Calendar (GSAC) changes* (Marianne Simm)	SEN-Regular

11. CREATEs (Bernie Duncker and Leslie Copp)	Information
 12. SGRC Facilitated Discussions – follow up (Guest: Melanie Will, 11:30 a.m.) - additional material to be distributed to members ahead of the meeting 	Information
13. Other Business	Information
14. Next Meeting: 18 September 2023 from 10:30 a.m 12 noon; NH3318	Information

*material attached ** to be distributed separately "SGRC" to be approved on behalf of Senate "SEN" to be recommended to Senate for approval

6 June 2023

Mike Grivicic Associate University Secretary

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 GRADUATE & RESEARCH COUNCIL Minutes of the 8 May 2023 Meeting [in agenda order] Needles Hall 3318

Present: Ramona Bobocel, Jeff Casello, Charmaine Dean, Rob de Loe, Peter Deadman, Bernie Duncker, Anna Esselment, Bertrand Guenin, Neela Hasan, Brian Laird, William McIlroy, Joseph Meleshko, Ian Milligan, Liz Nilsen, Martin Ross, Marianne Simm, Mike Szarka, Tim Weber-Kraljevski (Secretary), Richard Wikkerink

Resources: Angela Christelis, Trevor Clews, Carrie MacKinnon-Molson

Guests: Leslie Copp

Regrets: Amelia Clarke, Aiman Fatima, Ana Ferrer, Alison Hitchens*, Reyan Johnson, Zerihun Kinate, Anita Layton*, Ryan Johnson, Julie Joza*, Manoj Sachdev*, Siva Sivoththaman*, Shirley Tang*, Shawn Wetting

Organization of Meeting: Jeff Casello, co-chair of the council, took the chair, and Tim Weber-Kraljevski acted as secretary. The secretary advised that due notice of the meeting had been given, a quorum was present, and the meeting was properly constituted.

DECLARATIONS OF CONFLICT OF INTEREST

No conflicts of interest were declared.

CONSENT AGENDA

Council heard a motion to approve or receive for information the items of the consent agenda. Deadman and Bobocel. Carried.

1. MINUTES OF 10 April 2023

Council approved the minutes of the meeting as distributed.

2. GRADUATE AWARDS

Council approved items a to d as presented.

3. CURRICULAR SUBMISSIONS

Council approved items a to c as presented.

REGULAR AGENDA

4. BUSINESS ARISING FROM THE MINUTES

There was no business arising.

5. CO-CHAIRS' REMARKS

Casello provided a brief update on the following: (a) the recent increase in media attention concerning research security, the needed for more due diligence prior to making new partnerships and bringing visitors to campus, and the resources available through the Office of Research; (b) the continued challenge of low number NSERC Doctoral Scholarship recipients at Waterloo and possible strategies for increasing applications; and (c) that the Policy 70 Policy Drafting Committee has created an initial draft of the revised Policy and will be consulting various stakeholders, including the Senate Graduate & Research Council. Members discussed: research security, areas of concern and the request that those with dissenting voices within the university community, to be directed to Casello, Dean, and Milligan to voice their concern internal before voicing them externally; and exploring Tri-Agency quotas further to investigate if there are any avenues for raising them.

7. CREATEs

Leslie Copp presented on the NSERC Collaborative Research and Training Experience (CREATE), providing an overview of the program, the low success rate for Waterloo, challenges with the program, and particular areas

Waterloo has fallen short, including: providing a defined training program; providing justification for the need of the CREATE program; providing evidence of EDI planning for the team and the program; demonstrating feasibility, program management, and plans for sustainability; and shortfall with internal processes. Members discussed: challenges with the program resulting in insufficient motivation for faculty members; consequence for Waterloo underperforming on CREATE applications; the characteristics of successful applications; strategies for encourage and supporting applications; and strategies for a top-down approach to identify gaps that could be filled using the CREATE program. Duncker informed members that this presentation was meant as an introduction to the topic and that a more fulsome discussion on how the university can reach its full potential with the CREATE program will take place at the June 12, 2023 meeting.

8. OTHER BUSINESS

There was no other business.

9. NEXT MEETING

The next meeting will be held Monday 12 June 2023 from 10:30 a.m. to 12 noon in NH 3318.

9 May 2023

Tim Weber-Kraljevski Governance Officer

Memorandum

То:	Members Senate Graduate and Research Council (SGRC)
From:	Julie Joza Director, Research Ethics
Date:	May 29, 2023
Subject:	Membership on the Research Ethics Boards

This memo outlines membership updates that will be taking place on the Ethics Boards. This update is for consideration and approval by the Senate Graduate and Research Council.

Member Extensions

<u>Brendan Pinto</u>, PhD student, Kinesiology and Health Sciences, currently serves as a student member on the Clinical Research Ethics Board (CREB). Brendan's first term on CREB began in September 2021, and was scheduled to end on August 31, 2023. Brendan would like to continue service on CREB until December 31, 2023.

<u>Aiman Fatima</u>, MSc student, Kinesiology and Health Sciences, currently serves as a student member on the Human Research Ethics Board (HREB). Aiman's first term on HREB began in January 2022 and was scheduled to end on August 31, 2023. Aiman would like to continue service on HREB until April 30, 2024.

Reminder: SGRC members who wish to learn more about the qualifications or academic background and interests of the individual being nominated to the REB are encouraged to contact Julie Joza, Director, Research Ethics at jajoza@uwaterloo.ca. Julie will be pleased to discuss with SGRC members in advance of the meeting the information they may need to help support their decision to recommend the nomination of the individual in becoming a member of the REB. On behalf of the SGRC, the research ethics office retains a copy of each member's CV and expression of interest in being a REB member.



Graduate Studies and Postdoctoral Affairs

May 30, 2023

TO:	Mike Grivicic, Associate University, Senate Graduate and Research Council
FROM:	Heidi Mussar, Associate Director, Graduate Financial Aid & Awards
RE:	Agenda items for Senate Graduate & Research Council – June 2023

Items for Approval

a) Faculty of Environment Graduate Student Research Dissemination Award - operating Through a commitment of financial support from the Faculty of Environment, awards are available to encourage full-time and part-time research-based graduate students in the Faculty of Environment to present their own research (oral, poster, paper) at an academic conference and engage in academic dialogue within their field of study and research. Recipients will receive an award valued at \$150 for in-person conferences. Interested students must submit an application that is available on the Faculty of Environment website prior to the conference as soon as they have confirmed that they will be presenting at a conference. Applicants will be notified of the decision within 2 weeks of submitting their application. Upon approval, the award will be applied to the term in which the conference occurs. The award will be coded to the student's Quest account and first applied to any outstanding tuition and incidental fees. Any credit balance will be released as a refund via direct deposit.

b) Professor Safieddin (Ali) Safavi-Naeini Graduate Scholarship – endowment

A scholarship, valued at \$1,500, will be provided annually to a full-time graduate student enrolled in a research-based master's or doctoral program in the Electrical and Computer Engineering department. Selection will be based on academic excellence (minimum 80% cumulative average in their current program or over the last two full-time academic years). Applicants must also demonstrate interest in conducting research in electromagnetics, ranging from radio to microwave to terahertz and optics, and applied to a variety of topics including, but not limited to, communications, imaging, superconductivity, and biomedical sensing. Interested students should submit an application by January 31 to the Engineering Graduate Office. A recipient will be selected annually by the Faculty of Engineering. This scholarship was established by the family and friends to create a legacy for Safieddin (Ali) Safavi-Naeini who strived to be a research mentor and a friend through his compassionate and caring spirit. Prof. Ali. was a Professor in the Department of Electrical and Computer Engineering and the director of the Centre for Intelligent Antenna and Radio Systems.

Total gift = \$50k

c) Department of Philosophy Congress Graduate Award - trust

The Department of Philosophy Congress Graduate Award has been established to provide funding to master's and doctoral students who present their research at the Canadian Congress of Humanities and Social Sciences. Recipients will receive an award valued at up to \$1,500 to assist with the cost of in-person travel to the conference. Interested students must submit an application that is available on the Department of Philosophy website by April 15th. The Graduate Committee in the Department of Philosophy will select recipients and determine the value based on budget available. Applicants will be notified of the decision within two weeks of submitting their application. Upon approval, the award will applied to the term in which the conference occurs. The award will be coded to the student's Quest account and first applied to any outstanding tuition and incidental fees. Any credit balance will be released as a refund to the student via direct deposit.

Items for Information

d) Science Graduate Award - operating

Originally established in April 2019, the Faculty of Science is amending the terms of reference by updating the values associated with the award. The changes are as below:

Student Type	Current	New
Domestic MSc students	\$5,000/year for max of 2 years	\$3,750/year for max of 2 years
Int'l MSc students	\$4,500year for max of 2 years	\$3,375/year for max of 2 years
Domestic PhD students	\$8,000/year for max of 4 years	\$6,000/year for max of 4 years
Int'l PhD students	\$4,500/year for max of 4 years	\$3,375/year for max of 4 years

The new award description will be as follows:

Awards, valued at a minimum of \$3,375 per year, are available to support eligible graduate students registered full time in a research-based master's or doctoral program in the Faculty of Science. Students are automatically considered for this award throughout their eligibility period and may be nominated, without the need for an application, by their programs to the Associate Dean of Science, Graduate Studies.

e) Buitrago Opportunity Graduate Scholarship in Engineering – trust

Originally established in 2020, one of the eligibility criteria is being broadened to increase the number of students within the potential applicant pool. Instead of being restricted to research-based master's programs in the Faculty of Engineering, students registered in course-based master's programs in Engineering will now be eligible. The rest of the criteria remains the same.

The updated award description will now read as follows:

Scholarships, valued at \$50,000 will be provided to graduate students who will be registered full time in a research-based master's program in the Faculty of Engineering. The award will be spread equally over six academic terms. Selection will be based on academic achievement (minimum cumulative average of 75% or equivalent in their current or most recently completed program). Preference will be given to a student who received a degree in Mechanical Engineering from the Industrial University of Santander, Colombia then to a student who received any degree in Engineering from the Industrial University of Santander, Colombia, then to a student who received any degree in Engineering from any university in Colombia. A recipient will be selected in the winter term based on the student's application for admission to the program. This fund is made possible by a donation from Jorge Buitrago.

FACULTY OF ENVIRONMENT - GRADUATE STUDIES COMMITTEE

REPORT TO FACULTY COUNCIL

June 12 2023

1. Courses Changes for Approval

- a. Revision GEMCC 690 Added GEOG 452 as an anti-requisite
- b. New GEOG 662 Currently held with an undergraduate course but expected to be offered regularly in the coming years.



Prior to form submission, review the <u>content revision instructions</u>. For questions about the form submission, contact <u>Trevor Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Environment

Effective date: Term: Winter Year: 2024

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

□ New: Choose an item.

□ Inactivate: Choose an item.

Revise: from Choose an item. to Choose an item.

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

□ New:	Complete all course elements below
□ Inactivate:	Complete the following course elements: Course subject code, Course number, Course ID, Course title
⊠ Revise:	Complete all course elements below to reflect the proposed change(s) and identify the elements being revised (<i>e.g. Course description, Course title</i>):

Requisites – adding GEOG 452 as an additional anti-requisite.

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: GEMCC

Course number: 690

Course ID: 016192

Course title (max. 100 characters including spaces): Climate Change Projects

Course short title (max. 30 characters including spaces): Climate Change Projects

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description:

In this problem-based learning course, concepts, knowledge and skills developed throughout the program are integrated and applied to research projects. The focus of this highly interactive course is the development, implementation and communication of applied research to contribute knowledge and solutions to climate change

course

challenges specified by government, business or civil society. Students work in small collaborative teams in an interdisciplinary, professional practice environment.

Meet type(s): Seminar Choose an item. Choose an item. Choose an item.

Primary meet type: Seminar

Delivery mode: On-campus

Anti-requisites: GEMCC 675 Topic 1 and GEOG 452

Special topics course: Yes \Box No \boxtimes

Cross-listed course: Yes \Box No \boxtimes

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

To add GEOG 452 as an anti-requisite as GEOG 452 covers some of the same material as GEMCC 690.

Form completed by: Department/School approval date (03/31/23): Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 03/22/23 Faculty approval date (mm/dd/yy): 05/09/23 Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):



Prior to form submission, review the <u>content revision instructions</u>. For questions about the form submission, contact <u>Trevor Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Environment

Effective date: Term: Fall Year: 2024

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

□ New: Choose an item.

□ Inactivate: Choose an item.

Revise: from Choose an item. to Choose an item.

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

☑ New: Complete all course elements below

- □ Inactivate: Complete the following course elements: Course subject code, Course number, Course ID, Course title
- □ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: GEOG

Course number: 662

Course ID:

Course title (max. 100 characters including spaces): Transforming Canadian Resource Management

Course short title (max. 30 characters including spaces): Transforming CND Resource Mgmt

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: 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.	Held with GEOG 456.
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Meet type(s): Lecture Field Choose an item. Choose an item.

Primary meet type: Lecture

Delivery mode: On-campus

Requisites: Antireq: GEOG 456, ERS 456, GEOG 474 Topic 004, GEOG 694 Topic 003

Special topics course: Yes \Box No \boxtimes

Cross-listed course: Yes \Box No \boxtimes

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with: GEOG 456

Rationale for request:

This course is currently offered/held-with with an undergraduate course (GEOG 456) under the GEOG 694 Environmental Management Special Topics Course number (topic 3) but is expected to be offered regularly in coming years. Creating a course in the Calendar will allow the inclusion of an anti-requisite to the undergraduate course.

Form completed by: Maria Strack Department/School approval date (mm/dd/yy): 03/31/23 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 04/18/23 Faculty approval date (mm/dd/yy): 05/09/23 Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):



MEMORANDUM

To: Senate Graduate & Research Council

CC: Bernard P. Duncker, Associate Vice-President, Research and International Sheila Ager, Dean of Arts Mary Wells, Dean of Engineering Bob Lemieux, Dean of Science Mark Giesbrecht, Dean of Mathematics Lili Liu, Dean of Health Bruce Frayne, Dean of Environment Tim Weber-Kraljevski, Governance Officer, Secretariat

- From: Charmaine B. Dean, Vice-President, Research and International
- Date: June 02, 2023
- Subject: Extensions for Centres and Institutes

- For decision -

Following consultations to prepare for the upcoming review of Interdisciplinary Supports and Structures, all renewals of Waterloo Research Centres and Institutes will be temporarily paused. With the support of all six Deans, an extension is being proposed to the end date of those Centres and Institutes that will soon be or are currently up for renewal such that their new end date is December 31st, 2024 (indicated in the table below).

The recommendations of the review of Interdisciplinary Supports and Structures will guide the future of interdisciplinary activities at Waterloo. Once the review has been completed, its recommendations will be brought forward to SGRC, and their potential implications for renewal processes will be communicated to Centre and Institute Executive Directors.

Motion: That the Waterloo Centres and Institutes listed below be given revised mandate end dates of December 31, 2024.

Centre	Current Term End Date	Revised Renewal Date
Centre for Bioengineering and Biotechnology	31-Dec-23	31-Dec-24
Waterloo Climate Institute	End date has passed	31-Dec-24
Water Institute	31-May-24	31-Dec-24
Waterloo Institute for Nanotechnology	30-Apr-24	31-Dec-24
Waterloo Institute for Sustainable Energy	31-May-24	31-Dec-24
Institute for Quantum Computing	End date has passed	31-Dec-24
Global Health Policy and Innovation Research Centre	31-Jul-23	31-Dec-24
Waterloo Centre for German Studies	31-Mar-24	31-Dec-24
Centre for Theoretical Neuroscience	30-Nov-23	31-Dec-24

Centre	Current Term End	Revised Renewal	
	Date	Date	
Centre for Accounting Research and Education	30-Sep-23	31-Dec-24	
Centre for Advanced Materials Joining	30-Oct-23	31-Dec-24	
Waterloo Centre for Electrochemical Energy	End date has passed	31-Dec-24	
Centre for Ocular Research & Education	28-Feb-24	31-Dec-24	
Waterloo Centre for Astrophysics	30-Sep-23	31-Dec-24	
Waterloo Centre for Microbial Research	End date has passed	31-Dec-24	

ARTS GRADUATE STUDIES

May 19, 2023

TO:	Members, Senate Graduate and Research Council
FROM:	Maha Eid, Graduate Studies and Research Officer
RE:	Graduate Affairs Group Reports

The attached Arts Graduate Affairs Group reports were approved by the Arts Faculty Council meeting on May 16, 2023 and are now being submitted for approval by the Senate Graduate and Research Council on June 12, 2023.

Maha Eid

Maha Eid

Attach.

Senate Graduate and Research Council

CURRICULAR ITEMS for approval [bottom right pagination]

A) Political Science

- a. Revise the following course:
 - i. PSCI 621 (update course title from Political Theory 1 to Contemporary Political Theory and update course description) [2-3]
- b. Create the following courses:
 - i. PSCI 637 (Introduction to Machine Learning for Public Policy) [4-5]

B) Sociology

- a. Inactivate the following course:
 - i. SOC 730 (cross listed with RS 730) [6-7]

C) Religious Studies

- a. Inactivate the following course:
 - i. RS 730 (cross listed with SOC 730) [8-9]

D) Psychology

- a. PhD in Psychology
 - ii. Articulate the criteria for students to obtain a graduate research field designation on their transcript [10-11]
- b. MA in Psychology
 - iii. Adding the MA degree requirements to include a Developmental Psychology graduate research field. Adding this MA will provide students who wish to complete a PhD in Developmental Psychology with the opportunity to enroll in a more research focused Master's degree. Articulate the criteria for students to obtain a graduate research field designation on their transcript. [12-15]



Graduate Studies Course/Milestone Form

Prior to form submission, review the <u>content revision instructions</u>. For questions about the form submission, contact <u>Trevor</u> <u>Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Arts

Effective date: Term: Fall Year: 2023

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

New: Choose an item.

□ Inactivate: Choose an item.

Revise: from Choose an item. **to** Choose an item.

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

- □ New: Complete all course elements below
- □ Inactivate: Complete the following course elements: Course subject code, Course number, Course ID, Course title
- Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Updating the Course title and Course description.

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: PSCI

Course number: 621

Course ID: 002420

Course title (max. 100 characters including spaces):

Current title: Political Theory I Revised title: Contemporary Political Theory

Course short title (max. 30 characters including spaces): Contemporary Political Theory

Grading basis: Numerical
Course credit weight: 0.50
Course consent required: Not required
Course description:
Current description: Problems in classical and contemporary political theory.
Revised description: An examination of normative understandings of freedom and equality and the ways different theorists measure them. An analysis of the impact that different framings of major concepts have on structures of justice and their implications for institutional design.
Meet type(s): Seminar Choose an item. Choose an item. Choose an item.
Drimany meet type: Seminar

Primary meet type: Seminar

Delivery mode: On-campus

Requisites: N/A

Special topics course:	Yes		No	\boxtimes

Cross-listed course: Yes 🗆 No 🗵	\boxtimes
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Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

To make the course description and title more specific and reflective of course content.

Form completed by: Maysah Eid Department/School approval date (mm/dd/yy): 02/15/23 Reviewed by GSPA (for GSPA use only) ☑ date (mm/dd/yy): 03/13/23 Faculty approval date (mm/dd/yy): 05/16/23 Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):



Senate Graduate & Research Council

Graduate Studies Course/Milestone Form

Prior to form submission, review the <u>content revision instructions</u>. For questions about the form submission, contact <u>Trevor</u> <u>Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Arts

Effective date: Term: Fall Year: 2023

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

New: Choose an item.

□ Inactivate: Choose an item.

Revise: from Choose an item. to Choose an item.

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

 \boxtimes New: Complete all course elements below

- □ Inactivate: Complete the following course elements: Course subject code, Course number, Course ID, Course title
- □ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: PSCI

Course number: 637

Course ID:

Course title (max. 100 characters including spaces): Introduction to Machine Learning for Public Policy

Course short title (max. 30 characters including spaces): Machine Learning Public Policy

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: This course is an introduction to machine learning and other complex statistical methods that can be used to analyze a wide array of policy issues based on the use of open data. Learners must have knowledge of multivariate regression methods and be trained in the basic use of python or R to take this course.

Meet type(s): Seminar	Choose an item.	Choose an item.	Choose an item.
Primary meet type: Seminar			
Delivery mode: On-campus			
Requisites: N/A			
Special topics course: Y	′es □	No 🗵	
Cross-listed course:	Yes 🗆	No 🛛	

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

This course is needed for MPS students pursuing the GDip in CDASH. The course cannot be a PS course as MPS students need to take a course from another department/school for the GDip breadth requirement. Therefore, the Department decided to offer it under PSCI and it would typically be offered by a sessional instructor (out of the MPS budget).

Form completed by: Maysah Eid Department/School approval date (mm/dd/yy): 02/15/23 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 03/13/23 Faculty approval date (mm/dd/yy): 05/16/23 Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):



Graduate Studies Course/Milestone Form

Prior to form submission, review the <u>content revision instructions</u>. For questions about the form submission, contact <u>Trevor</u> <u>Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Arts

Effective date: Term: Fall Year: 2023

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

New: Choose an item.

□ Inactivate: Choose an item.

Revise: from Choose an item. to Choose an item.

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

- □ New: Complete all course elements below
- ☑ Inactivate: Complete the following course elements: Course subject code, Course number, Course ID, Course title
- Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: SOC

Course number: 730

Course ID: 003051

Course title (max. 100 characters including spaces): Sociology of Religion

Course short title (max. 30 characters including spaces):

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: The course examines key substantive, theoretical and methodological issues of the sociology of religion through the detailed study of important classical and contemporary works in the field. Representative issues addressed are: the social and psychological nature and function of religious experience, the character of conversion processes, the social and political implications of religious ideologies and organizations, the status of religious beliefs and practices in an age of seeming secularization. Attention will be given to both western and non-western religious traditions as well as to both established and newer forms of religious life.

Meet type(s): Seminar Choose an item. Choose an item. Choose an item.

Primary meet type: Seminar		
Delivery mode: On-campus		
Requisites:		
Special topics course: Yes \Box	No	\boxtimes
Cross-listed course: Yes 🛛	No	

Course subject code(s) and number(s) to be cross-listed with and approval status: RS 730 - *inactive request for RS 730 also submitted*

Sections combined/held with:

Rationale for request:

The course has not been offered since Winter 2016 and is unlikely to be offered again in the near future.

Form completed by: Department/School approval date (mm/dd/yy): 01/26/23 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 03/09/23 Faculty approval date (mm/dd/yy): 05/16/23 Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):



Graduate Studies Course/Milestone Form

Prior to form submission, review the <u>content revision instructions</u>. For questions about the form submission, contact <u>Trevor</u> <u>Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Arts

Effective date: Term: Fall Year: 2023

Milestone

Note: milestone changes also require the completion/submission of the <u>Graduate Studies Program Revision Template</u>.

New: Choose an item.

□ Inactivate: Choose an item.

Revise: from Choose an item. **to** Choose an item.

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

- □ New: Complete all course elements below
- ☑ Inactivate: Complete the following course elements: Course subject code, Course number, Course ID, Course title
- □ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: RS

Course number: 730

Course ID: 003051

Course title (max. 100 characters including spaces): Sociology of Religion

Course short title (max. 30 characters including spaces):

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: The course examines key substantive, theoretical and methodological issues of the sociology of religion through the detailed study of important classical and contemporary works in the field. Representative issues addressed are: the social and psychological nature and function of religious experience, the character of conversion processes, the social and political implications of religious ideologies and organizations, the status of religious beliefs and practices in an age of seeming secularization. Attention will be given to both western and non-western religious traditions as well as to both established and newer forms of religious life.

Meet type(s): Seminar Choose an item. Choose an item. Choose an item.

Primary meet type: Seminar		
Delivery mode: On-campus		
Requisites:		
Special topics course: Yes \Box	No	\boxtimes
Cross-listed course: Yes 🛛	No	

Course subject code(s) and number(s) to be cross-listed with and approval status: SOC 730 - *inactive request for SOC 730* also submitted

Sections combined/held with:

Rationale for request:

The course has not been offered since Winter 2016 and is unlikely to be offered again in the near future.

Form completed by: Jeff Wilson, Acting Religious Studies Associate Chair, Graduate
Department/School approval date (mm/dd/yy): 02/17/23
Reviewed by GSPA (for GSPA use only) ☑ date (mm/dd/yy): 02/09/23 (this is the date that SOC 730 was reviewed)

Faculty approval date (mm/dd/yy): 05/16/23

Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):



Graduate Studies

Program Revision Template

Prior to form submission, review the <u>content revision instructions</u> and information regarding <u>major/minor modifications</u>. For questions about the form submission, contact <u>Trevor Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Arts

Program: Doctor of Philosophy (PhD) in Psychology

Program contact name(s): Jonathan Fugelsang

Form completed by: Jonathan Fugelsang

Description of proposed changes:

Note: changes to courses and milestones also require the completion/submission of the SGRC Graduate Studies Course/Milestone Form.

Articulating the criteria for students to obtain a graduate research field designation on their transcript.

Is this a major modification to the program? No

Rationale for change(s):

It can be advantageous for students to have their graduate research field area noted on their transcripts. We are adding clarity to the Calendar in order for the graduate field designation to be added to the transcript.

Proposed effective date: Term: Fall Year: 2023

Current <u>Graduate Studies Academic Calendar (GSAC)</u> page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/arts/department-psychology/doctor-philosophy-phd-psychology

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
Graduate research fields	Graduate research fields
 Clinical Psychology Cognitive Neuroscience Cognitive Psychology Developmental Psychology 	 Clinical Psychology Cognitive Neuroscience Cognitive Psychology Developmental Psychology
 Industrial/Organizational Psychology Social Psychology 	 Industrial/Organizational Psychology Social Psychology
PhD Thesis	• PhD Thesis

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
• The Department requires a successful	 The Department requires a successful
defense of the PhD Thesis.	defense of the PhD Thesis.
	 <u>Students must be admitted to one of</u>
	the following Graduate Research
	<u>Fields:</u>
	 <u>Clinical Psychology</u>
	 <u>Cognitive Neuroscience</u>
	 <u>Cognitive Psychology</u>
	 <u>Developmental Psychology</u>
	 <u>Industrial/Organizational</u>
	<u>Psychology</u>
	 <u>Social Psychology</u>
	 <u>A Graduate Research Field is a</u>
	University credential that is recognized
	on the student's transcript and is
	intended to reflect that a student has
	successfully completed research
	concentrated in the area of the
	Graduate Research Field. The
	Department, represented by the
	student's supervisor and examining
	committee, must assess whether a
	student's completed research warrants
	the field designation at the time of
	<u>degree completion. To obtain the</u>
	Graduale Research Field designation,
	students must also complete the
	chosen Graduate Research Field
	outlined in the above course
	requirements section
	requirements section.

How will students currently registered in the program be impacted by these changes?

Articulating the criteria for students to obtain a graduate research field designation on their transcript will permit students currently enrolled in the program to receive that designation on their transcript when they graduate.

Department/School approval date (mm/dd/yy): 04/11/23 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 04/13/23 Faculty approval date (mm/dd/yy): 05/16/23 Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy): Senate approval date (mm/dd/yy) (if applicable):



Graduate Studies

Program Revision Template

Prior to form submission, review the <u>content revision instructions</u> and information regarding <u>major/minor modifications</u>. For questions about the form submission, contact <u>Trevor Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Arts

Program: Master of Arts (MA) in Psychology

Program contact name(s): Jonathan Fugelsang

Form completed by: Jonathan Fugelsang

Description of proposed changes:

Note: changes to courses and milestones also require the completion/submission of the SGRC Graduate Studies Course/Milestone Form.

- 1) Updating the MA degree requirements to include a "Developmental Psychology" graduate research field.
- 2) Articulating the criteria for students to obtain a graduate research field designation on their transcript.

Is this a major modification to the program? Yes

Rationale for change(s):

- 1) Currently, students who wish to do a Master's degree in Developmental Psychology only have the MASc in Psychology - Developmental & Communication Science option. This MASc program was originally designed for students with more applied interests, or who are unsure about continuing to a PhD. It is a fast-tracked 1year (3-term) program that has a reduced research requirement, requiring a Masters Research Paper (rather than a thesis), as well as a community internship. For students who intend to continue on to a PhD, having a 2-year research-focused MA degree with a thesis would be advantageous. We have recently needed to transfer some students in the MASc program to a non-specialized research field MA in order to accommodate their research goals, and current graduate students who have been consulted with have expressed that having a research focused Developmental Psychology MA option to apply to and enroll into would be advantageous. Essentially, adding the Developmental Psychology graduate research field to the MA program will provide more flexibility for students, and also align the requirements of the Developmental Psychology program with those of the other research fields. Furthermore, the PhD program already has the Developmental Psychology graduate research field, so adding this field at the MA level will provide continuity for students.
- 2) It can be advantageous for students to have their graduate research field area noted on their transcripts. We are adding clarity to the Calendar in order for the graduate research field designation to be added to the transcript.

Proposed effective date:

Term: Winter Year: 2024

Current <u>Graduate Studies Academic Calendar (GSAC)</u> page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/qraduate-studies-academic-calendar/arts/department-psychology/master-arts-ma-psychology

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
Graduate research fields	Graduate research fields
 Clinical Psychology Cognitive Neuroscience Cognitive Psychology Social Psychology Degree requirements	 Clinical Psychology Cognitive Neuroscience Cognitive Psychology <u>Developmental Psychology</u> Social Psychology
Thesis option:	
 Courses Students must complete 2 two-term or 4 one-term courses accepted for graduate credit by the Department. Specific course offerings in each Area will differ from year to year. The statistics requirement may be met by satisfactory performance in at least 1 of 2 core statistics courses: PSYCH 630 Advanced Analysis of Variance and PSYCH 632 Multiple Regression. Master's Thesis 	 Courses Students must complete 2 two-term or 4 one-term courses accepted for graduate credit by the Department. Specific course offerings in each Area will differ from year to year. The statistics requirement may be met by satisfactory performance in at least 1 of 2 core statistics courses: PSYCH 630 Advanced Analysis of Variance and PSYCH 632 Multiple Regression.
• Waster's Percerch Paper option:	Master's Thesis Students must be admitted to one of
 Note: students must receive special permission from the Department to enter the Master's Research Paper option. Courses Students must complete 4 two-term or 8 one-term courses, accepted for graduate credit by the Department. The statistics requirement may be met by satisfactory performance in at least 1 of 2 core statistics courses: PSYCH 630 Advanced Analysis of Variance and PSYCH 632 Multiple Regression. 	 <u>clinical Psychology</u> <u>Clinical Psychology</u> <u>Cognitive Neuroscience</u> <u>Cognitive Psychology</u> <u>Developmental Psychology</u> <u>Social Psychology</u> <u>Social Psychology</u> <u>Social Psychology</u> <u>Ministrative Contents</u> <u>A Graduate Research Field is a</u> <u>University credential that is recognized</u> <u>on the student's transcript and is</u> <u>intended to reflect that a student has</u> <u>successfully completed research</u> <u>concentrated in the area of the</u> <u>Graduate Research Field. The</u> <u>Department, represented by the</u>

• Master's Research Paper

student's supervisor and reading

committee must assess whether a student's completed research warrants the field designation at the time of degree completion. To obtain the Graduate Research Field designation, a student must also complete the

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:	
	requirements associated with the MA	
	<u>degree.</u>	
	Master's Research Paper option:	
	Note: students must receive special permission from the Department to enter the Master's Research Paper option.	
	 Courses Students must complete 4 two-term or 8 one-term courses, accepted for graduate credit by the Department. The statistics requirement may be met by satisfactory performance in at least 1 of 2 core statistics courses: PSYCH 630 Advanced Analysis of Variance and PSYCH 632 Multiple Regression. 	
	 Master's Research Paper Students must be admitted to one of the following Graduate Research Fields: Clinical Psychology Cognitive Neuroscience Cognitive Psychology Developmental Psychology Social Psychology	

How will students currently registered in the program be impacted by these changes?

Adding the MA graduate research field will not affect students already registered in the program.

Articulating the criteria for students to obtain a graduate research field designation on their transcript will permit students currently enrolled in the program to receive that designation on their transcript when they graduate.

Department/School approval date (mm/dd/yy): 04/11/23 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 04/13/23 Faculty approval date (mm/dd/yy): 05/16/23 Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy): Senate approval date (mm/dd/yy) (if appl



ΜΕΜΟ

TO:	Tim Weber- Kraljrveski, Governance Officer Secretariat
FROM:	S. Sivoththaman, Associate Dean, Graduate Studies, Faculty of Engineering
RE:	Senate Graduate and Research Council
DATE:	May 23, 2023

Please place the following motions forward for approval at the next meeting of the SGRC. These changes were approved by the EFC on May 16, 2023.

Items for Approval:

- 1. The department of **Management Sciences** would like to make the following calendar changes
 - a. Changing the entry method of the MMSc- Co-operative Program from transfer to direct entry.

Rationale for Request:

The Department of Management Sciences currently offers a transfer entry co-op program where MMSc students can apply for the co-op program after their first term in the program. To better support the MMSc co-op students and to grow the graduate programs, the Department decided to offer a direct co-op program.

- 2. The department of **Electrical and Computer Engineering** would like to make the following calendar changes
 - a. Adding a Doctor of Philosophy (PhD) in Electrical and Computer Engineering Aeronautics program.
 - b. Adding a Master of Applied Science (MASc) in Electrical and Computer Engineering Aeronautics program
 - c. Adding BE 660 Negotiations to the list of electives for the Graduate Specialization in Business Leadership for MEng and MEng Co-op students.

Rationale for Request:

- a. The Department of Electrical and Computer Engineering is joining the CAP as research is already being conducted by faculty and graduate students in this research areas.
- b. The Department of Electrical and Computer Engineering is joining the CAP as research is already being conducted by faculty and graduate students in this research areas.

- c. The Graduate Specialization in Business Leadership has been designed to introduce students to the processes and best practices for leading technical teams, processes, and organizations in a North American business context. The key purpose of leadership is creating a framework for action. Doing this well requires an understanding of people, familiarity with the "language" of business which is finance, and disciplinary expertise. The Graduate Specialization supplements the expertise students develop in the ECE MEng program with the core skills needed to lead a business venture. Adding BE660 as an elective will allow our graduate students an opportunity to strengthen their negotiation skills which may lead to favorable outcomes for our students in many real world situations.
- 3. The department of **Chemical Engineering** would like to make the following calendar changes
 - a. Inactivation of CHE 610 Theory and Application of Transport Phenomena

Rationale for Request:

a. This course has been re-numbered as CHE 601. CHE 610 was retained in the Calendar pending degree completion by students who took it towards degree requirements. Students have completed.

SS/em



Graduate Studies Program Revision Template

Prior to form submission, review the <u>content revision instructions</u> and information regarding <u>major/minor</u> <u>modifications</u>. For questions about the form submission, contact <u>Trevor Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Program: Master of Management Sciences (MMSc) - Co-operative Program

Program contact name(s): Hossein Abouee Mehrizi, Kim Dunne

Form completed by:

Description of proposed changes:

Note: changes to courses and milestones also require the completion/submission of the <u>SGRC Graduate Studies</u> <u>Course/Milestone Form</u>.

Changing the entry method of the MMSc - Co-operative Program from transfer entry to direct entry.

Is this a major modification to the program? No

Rationale for change(s):

The Department of Management Sciences currently offers a transfer entry co-op program where MMSc students can apply for the co-op program after their first term in the program. To better support the MMSc co-op students and to grow the graduate programs, the Department decided to offer a direct co-op program.

Proposed effective date: Term: Fall Year: 2023

Current <u>Graduate Studies Academic Calendar (GSAC)</u> page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-managementsciences/master-management-sciences-mmsc-co-operative-program

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
Program information	Program information
 Admit term(s)	 Admit term(s)
 Delivery mode On-campus 	 Delivery mode On-campus
 Length of program 5 terms (20 months) 	 Length of program 5 terms (20 months)
Program type	Program type

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
 Co-operative Master's Professional Registration option(s) Full-time Study option(s) 	 Co-operative Master's Professional Registration option(s) Full-time Study option(s)
• Coursework	• Coursework
 Minimum requirements Students in the MMSc program can apply to transfer into the MMSc Cooperative Program after completing at least one academic term. Admission will be decided based on the student's progress to date, and is subject to approval by the Department Associate Chair for Graduate Studies. Degree requirements Graduate Academic Integrity Module (Graduate AIM) Courses Students must successfully complete the following 4 General Requirement courses (0.50 unit weight per course/4 units): 	 Minimum requirements The Department of Management Sciences requires either (i) a 75% overall standing in the last two years, or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent; or (ii) a 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent, as the minimum requirement for admission to a Master's program for applicants educated at a Canadian institution. A 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent is the minimum requirement for admission to a Master's program for applicants educated outside of Canada. Background in quantitative methods (e.g., Calculus, Linear Algebra, Probability and Statistics). All applicants must submit a "Statement of Purpose" - a one page statement addressing their academic background and future goals. Applicants who fall slightly below the minimum academic requirements may be considered for admission as transitional or probationary students. Application materials Résumé/Curriculum vitae Supplementary information form Transcript(s) References Number of references: 2 Type of references: academic (preferred) or professional

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
 include at most 2 500-level courses approved by the Associate Chair for Graduate Studies. All other courses must be at the 600 and 700 level. Students must maintain an overall average of at least 73% at the end of each term, with no more than 2 failed courses overall. No more than 1 course (0.50 unit weight per course) may be taken outside of the Management Sciences Department. This course will require the approval of the Associate Chair for Graduate Studies. Students who have completed their BASc degree in Management Engineering at the University of Waterloo are required to choose their courses in consultation with the Associate Chair for Graduate Studies 	English language proficiency (ELP) (if applicable) Degree requirements The MMSc – Co-operative Program will enable students to combine graduate studies with work experience. The program includes completion of 2 required work terms. The work terms typically take place in terms 3 and 4. The work terms must meet Co-operative and Experiential Education (CEE) standard work term requirements and Departmental requirements. Students should apply to jobs related to their program of study. Note: the program must start and end on an academic term. Students in the program are encouraged to complete COOP 601 Career Success Strategies in the academic term prior to the first work term
 Graduate Studies Work Report I and Graduate Studies Work Report II Students in the program, who qualify, may choose a co-operative program of study. For a co-operative program of study a student must complete two work-terms and must complete the program during an academic term. The co-operative placements must relate to the program of study. Enrolment in the co-operative program must be approved by the student's supervisor and the Associate Chair Graduate Studies. Co-operative students are responsible for following the regulations and procedures of Co-operative and Experiential Education (CEE). 	 Graduate Academic Integrity Module (Graduate AIM) Courses Students must successfully complete the following 4 General Requirement courses (0.50 unit weight per course/4 units):

approved by the Associate Chair for Graduate Studies. All other courses must be at the 600 and 700 level.
Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	 Students must maintain an overall average of at least 73% at the end of each term, with no more than 2 failed courses overall. No more than 1 course (0.50 unit weight per course) may be taken outside of the Management Sciences Department. This course will require the approval of the Associate Chair for Graduate Studies. Students who have completed their BASc degree in Management Engineering at the University of Waterloo are required to choose their courses in consultation with the Associate Chair for Graduate Studies.
	 Graduate Studies Work Report I and Graduate Studies Work Report II Students must complete two work-term <u>experiences</u>. The co-operative <u>work-term experiences</u> must relate to the program of study. For each work <u>experience</u>, a work report must be <u>submitted to the Department for review</u> <u>to earn credit for the work report</u>. Students are responsible for following the <u>roles</u> and <u>responsibilities</u> of Co- operative and Experiential Education (CEE).

The change will not impact the students currently registered since it will be offered as of Fall 2024.

Department/School approval date (mm/dd/yy): 03/06/23 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 05/02/23 Faculty approval date (mm/dd/yy): Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy): Senate approval date (mm/dd/yy) (if applicable):



Graduate Studies Program Revision Template

Prior to form submission, review the <u>content revision instructions</u> and information regarding <u>major/minor</u> <u>modifications</u>. For questions about the form submission, contact <u>Trevor Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Program: Doctor of Philosophy (PhD) in Electrical and Computer Engineering - Aeronautics

Program contact name(s): Christopher Nielsen, Jared Rank

Form completed by: Christopher Nielsen, Jared Rank

Description of proposed changes:

Note: changes to courses and milestones also require the completion/submission of the <u>SGRC Graduate Studies</u> <u>Course/Milestone Form</u>.

The Department of Electrical and Computer Engineering is joining the Collaborative Aeronautics Program (CAP) and is thus adding a Doctor of Philosophy (PhD) in Electrical and Computer Engineering - Aeronautics program.

Is this a major modification to the program? Yes

Rationale for change(s):

After consultation with the ECE Graduate Studies Committee, which consists of Faculty and Graduate Student representatives, the department of Electrical and Computer Engineering is joining the Collaborative Aeronautics Program. Joining the CAP aligns with research that is already being conducted by faculty and graduate students in this area.

Proposed effective date: Term: Winter Year: 2024

Current <u>Graduate Studies Academic Calendar (GSAC)</u> page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-electrical-and-computerengineering

Current PhD in Electrical and Computer Graduate Studies Academic Calendar content:	Proposed PhD in Electrical and Computer Engineering - Aeronautics Graduate Studies Academic Calendar content:
DOCTOR OF PHILOSOPHY (PHD) IN ELECTRICAL AND COMPUTER ENGINEERING	DOCTOR OF PHILOSOPHY (PHD) IN ELECTRICAL AND COMPUTER ENGINEERING - <u>AERONAUTICS</u>
Graduate research fields	Graduate research fields
Antennas, Microwaves and Wave OpticsBiomedical	Antennas, Microwaves and Wave Optics Biomedical

Current PhD in Electrical and Computer Graduate Studies Academic Calendar content:	Proposed PhD in Electrical and Computer Engineering - Aeronautics Graduate Studies Academic Calendar content
 Circuits and Systems Including Computer - Aided Design Communications and Information Systems Computer Hardware Computer Software Nanotechnology Pattern Analysis and Machine Intelligence (PAMI) Power and Energy Systems Quantum Information Silicon Devices and Integrated Circuits Systems and Control Very Large Scale Integration (VLSI) Wireless Communication 	 Circuits and Systems Including Computer - Aided Design Communications and Information Systems Computer Hardware Computer Software Nanotechnology Pattern Analysis and Machine Intelligence (PAMI) Power and Energy Systems Quantum Information Silicon Devices and Integrated Circuits Systems and Control Very Large Scale Integration (VLSI) Wireless Communication
Program information	Program information
 Admit term(s) Fall Winter Spring 	 Admit term(s) Fall Winter Spring
Delivery mode On-campus	 Delivery mode On-campus
• Length of program • The minimum period of registration for the Doctoral degree is four terms after a Master's degree or equivalent and six terms after an Honours Bachelor's degree or equivalent. The maximum time limit is twelve terms after a Master's degree or equivalent and eighteen terms after an Honours Bachelor's degree or equivalent. Extensions beyond twelve terms must be approved by the Faculty Graduate Studies Office.	 Length of program The minimum period of registration for the Doctoral degree is four terms after a Master's degree or equivalent and six terms after an Honours Bachelor's degree or equivalent. The maximum time limit is twelve terms after a Master's degree or equivalent and eighteen terms after an Honours Bachelor's degree or equivalent. Extensions beyond twelve terms must be approved by the Faculty Graduate Studies Office.
 Program type Doctoral Research 	 Program type <u>Collaborative</u> Doctoral Research
 Registration option(s) Full-time Part-time 	 Registration option(s) Full-time Part-time
• Study option(s) • Thesis	 Study option(s) Thesis
Admission requirements Minimum requirements	Admission requirements
	1

Page 2 of 13

Current PhD in Electrical and Computer Graduate	Proposed PhD in Electrical and Computer
Studies Academic Galendar content.	Academic Calendar content:
 Admission to the program is based upon the student's academic record and evidence of ability to pursue independent research. Normally an overall standing equivalent to 80% in either a relevant thesis-based Master's degree or a University of Waterloo Master of Engineering (MEng) degree that includes a completed ECE 699 Master of Engineering Project course. At the time of admission, each student must have a faculty supervisor who has endorsed the recommendation for admission 	 Minimum requirements Admission to the program is based upon the student's academic record and evidence of ability to pursue independent research. Normally an overall standing equivalent to 80% in either a relevant thesis-based Master's degree or a University of Waterloo Master of Engineering (MEng) degree that includes a completed ECE 699 Master of Engineering Project course. At the time of admission, each student must have a faculty supervise who have
 Application materials Résumé 	endorsed the recommendation for admission.
 Supplementary information form Transcript(s) 	 Application materials Résumé Supplementary information form
 References Number of references: 3 Type of references: at least 2 academic 	 Transcript(s) References Number of references: 3 Transcript(s)
English language proficiency (ELP) (if applicable)	 I ype of references: at least 2 academic
Degree requirements	 English language proficiency (ELP) (if applicable)
 Graduate Academic Integrity Module (Graduate AIM) 	Degree requirements
 Courses The coursework associated with the 	 Graduate Academic Integrity Module (Graduate AIM)
program is intended to provide a foundation for advanced learning in the chosen field of research. A minimum of 4 courses (0.50 unit weight per course) is required for a PhD student holding a MASc degree or equivalent (7 0.50 unit weight courses from a Bachelor program). At least 2 of the courses must be from the list of approved core courses (updated by the Department annually) in one of the approved areas of specialization as specified in the student's letter of admission, unless this course requirement has already been achieved during a University of Waterloo Electrical and Computer Engineering MASc program. The	 Courses <u>Students admitted to the program with a non-Aeronautics MASc degree must obtain at least 5 courses (0.50 unit weight per course) of graduate credit including 2 Aeronautics core courses. The coursework associated with the program is intended to provide a foundation for advanced learning in the chosen field of research. A minimum of 4 courses (0.50 unit weight per course) is required for a PhD student holding a MASc degree or equivalent (7 0.50 unit weight courses from a Bachelor program). At least 2 courses must be from the list of approved core courses (updated by the Department annually)</u>

Current PhD in Electrical and Computer Graduate Studies Academic Calendar content:	Proposed PhD in Electrical and Computer Engineering - Aeronautics Graduate Studies Academic Calendar content:
Current PhD in Electrical and Computer Graduate Studies Academic Calendar content: remaining 2 courses may be taken from outside of the Department but must be from the faculties of Engineering, Math, and/or Science (unless otherwise approved). All PhD students are required to take a minimum of 2 ECE courses toward their degree requirements. Core courses may count towards this 2 course minimum. The choice of courses must meet with the approval of the supervisor. The faculty supervisor will consider the level and adequacy of each student's preparation in drawing up the candidate's program. It is expected that candidates will maintain a 78% minimum cumulative average in their course work. To obtain credit, an individual course must be passed with at least 75%. • Core courses: • Antennas, Microwaves, and Wave Optics • ECE 642 Radio Frequency Integrated Circuit Design • ECE 671 Microwave and RF Engineering • ECE 672 Optoelectronic Devices • ECE 675 Radiation and Propagation of Electromagnetic Fields • Biomedical • ECE 601 Foundations of Biology in Engineering • ECE 603 Ruantitative Methods in Biomedical Engineering • ECE 603 Ruantitative Methods in Biomedical Engineering • ECE 603 Ruantitative Methods in Biomedical Engineering • ECE 603 Advanced Analog Integrated Circuits and Systems • ECE 636 Advanced Analog Integrated	Proposed PhD in Electrical and Computer Engineering - Aeronautics Graduate Studies Academic Calendar content: in one of the approved areas of specialization as specified in the student's letter of admission unless this course requirement has already been achieved during a University of Waterloo Electrical and Computer Engineering MASc program. The remaining 2 courses may be taken from outside of the Department but must be from the faculties of Engineering, Math, and/or Science (unless otherwise approved). All PhD Students are required to take a minimum of 2 ECE courses toward their degree requirements. Core courses may count towards this 2 course minimum. The choice of courses must meet with the approval of the supervisor. The faculty supervisor will consider the level and adequacy of each student's preparation in drawing up the candidate's program. It is expected that candidates will maintain a 78% minimum cumulative average in their course work. To obtain credit, an individual course must be passed with at least 75%. • Aeronautics Cre courses: • AVIA 601 Interdisciplinary Aeronautics Project - PhD Level • Students admitted to the program with a MASc in Electrical and Computer Engineering - Aeronautics degree from the University of Waterloo must obtain at least 5 courses (0.50 unit weight per course) of graduate credit including 1 Aeronautics core courses. Students are required to take a minimum of 2 ECE courses toward their degree requirements. The choice of courses must meet with the approval of the must meet with the approval of the
 ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio Frequency Integrated Circuit Design ECE 671 Microwave and RF Engineering 	 <u>requirements. The choice of courses</u> <u>must meet with the approval of the</u> <u>supervisor.</u> <u>Aeronautics core course:</u> <u>AVIA 802</u> <u>Interdisciplinary</u> <u>Aeronautics Project -</u> <u>PhD Level.</u> <u>Students admitted to the program with</u> <u>an incomplete Master's or Honours</u> <u>Bachelor's degree must obtain at least</u>

Current PhD in Electrical and Computer Graduate	Proposed PhD in Electrical and Computer
Studies Academic Calendar content:	Engineering - Aeronautics Graduate Studies
	Academic Calendar content:
 Communications and 	8 courses (0.50 unit weight per course)
Information Systems	of graduate credit including 2
 ECE 602 Introduction to 	Aeronautics core courses. Students are
Optimization or CO 602	required to take a minimum of 3 ECE
Fundamentals of	courses toward their degree
Optimization (cross	requirements. The choice of courses
listed with CM 740 and	must most with the approval of the
	Aeronaulics core courses:
Signal Processing	• <u>AVIA 601</u>
ECE 604 Stochastic	Interdiscipiinary
Processes	Aeronautics
 ECE 610 Broadband 	 <u>AVIA 802</u>
Communication	Interdisciplinary
Networks	<u>Aeronautics Project -</u>
 ECE 611 Digital 	PhD Level
Communications	 Aside from AVIA 601 & AVIA 802, only
 ECE 612 Information 	courses from the Faculties of Science,
Theory	Math and Engineering are permitted.
 ECE 613 Image 	 This degree is offered through the
Processing and Visual	Collaborative Aeronautics Program.
Communication	This program, jointly offered by a range
 Computer Hardware 	of departments/schools across several
ECE 606 Algorithm	academic faculties, promotes the
Design	development of interdisciplinary
 ECE 621 Computer 	perspectives on aeronautics.
Organization	Collaborative Aeronautics Program
■ FCF 627 Register-	students complete their specialist
transfer-level Digital	training in their respective home
Systems	departments/schools while working
ECE 637 Digital	with colleagues from a variety of other
Integrated Circuits	denartments/schools in core
Computer Software	interdisciplinary courses (AVIA 601 and
ECE 606 Algorithm	
Design and Analysis or	To obtain credit, an individual course
CO_{602} Eundomentals	must be passed with at least a 75%
of Optimization (cross	average
listed with CM 740 and	Students may be required to withdraw
	from the program at any time if they fail
Algorithm Dosign and	to maintain a minimum cumulativo
Anguna in Design and	average of 79% in their course work or
Allalysis	if they feil to receive actiofactory
ECE 052 Methods and Dringingles of Sefety	II they fail to receive satisfactory
Principles of Salety-	progress reports regarding their
	research activities.
	505
	⊖ <u>EUE c</u> ore courses:
Assurance and	 Antennas, Microwaves, and
Maintenance or CS 647	Wave Optics
Software Lesting,	- ECE 642 Radio
Quality Assurance, and	Frequency Integrated
Maintenance	Circuit Design
ECE 654 Software	 ECE 671 Microwave and
Reliability Engineering	RF Engineering

Page 5 of 13

Current PhD in Electrical and Computer Graduate Studies Academic Calendar content:	Proposed PhD in Electrical and Computer Engineering - Aeronautics Graduate Studies
	Academic Calendar content:
 ECE 656 Database Systems 	ECE 672 Optoelectronic Devices
 ECE 657A Data and 	 ECE 675 Radiation and
Knowledge Modelling	Propagation of
and Analysis or CS 680	Electromagnetic Fields
Introduction to Machine	-Biomedical
Learning or CS 686	ECE 601 Foundations of
Introduction to Artificial	Biology in Engineering
Intelligence CO 685 The	ECE 607 Fundamentals of Ultrasonics
Mathematics of Public-	 ECE 608 Quantitative
Key Cryptography or CS	Methods in Biomedical
658 Computer Security	Engineering
and Privacy or CO 687	 ECE 609 Engineering
Applied Cryptography	Analysis of Living Cells
 Nanotechnology 	 Circuits and Systems
 ECE 630 Physics and 	- ECE 636 Advanced
Models of	Analog Integrated
Semiconductor Devices	Circuits
• ECE 633	ECE 637 Digital
Nanoelectronics	Integrated Circuits
ECE 634 Organic	•ECE 642 Radio
Electronics	Frequency Integrated
ECE 635 Fabrication in the Nenegopole:	UICUIT Design
Ine Nanoscale:	- ECE 07 I MICTOWAVE AND DE Engineering
Principles, Technology	RF Engineening
ECE 672 Ontoelectronic	Information Systems
Devices	ECE 602 Introduction to
 PAMI - Pattern Analysis and 	Optimization or CO 602
Machine Intelligence	Fundamentals of
 ECE 606 Algorithm 	Optimization (cross-
Design and Analysis	listed with CM 740 and
 ECE 613 Image 	CS 795)
Processing and Visual	 ECE 603 Statistical
Communication	Signal Processing
 ECE 657 Tools of 	 ECE 604 Stochastic
Intelligent Systems	Processes
Design	- ECE 610 Broadband
 ECE 657A Data and 	Communication
Knowledge Modelling	Networks
and Analysis	•—ECE 611 Digital
ECE 659 Intelligent	Communications
Sensors and Sensor	•—ECE 612 Information
Networks	
 Power and Energy Systems 	EUE 613 IMage
EUE 062 POWER	Processing and Visual
	- EVE OUD AIGUILIIII Docian
	ECE 621 Computer
- LOL 000 Thigh voltage Engineering Applications	<u>- Loc oz i Computei</u> Organization
	Organization

Current PhD in Electrical and Computer Graduate Studies Academic Calendar content:	Proposed PhD in Electrical and Computer Engineering - Aeronautics Graduate Studies
	Academic Calendar content:
 ECE 666 Power Systems Operation ECE 668 Distribution System Engineering ECE 760 Special Topics in Power Systems and High Voltage Engineering (topic 11 Power System Protection and Relaying) or ECE 765 Power System Protection and Relaying Quantum Information ECE 676 Quantum Information Processing Devices (cross-listed with QIC 750) ECE 677 Quantum Electronics and Photonics (cross-listed with QIC 885) QIC 710 Quantum Information Processing Silicon Devices and Integrated Circuits ECE 630 Physics and Models of Semiconductor Devices ECE 631 Microelectronic Processing Technology ECE 634 Advanced Analog Integrated Circuits ECE 634 Advanced Analog Integrated Circuits ECE 642 Radio Frequency Integrated Circuit Design ECE 672 Optoelectronic Devices Systems and Controls ECE 602 Introduction to Optimization or CO 602 Fundamentals of Optimization (cross- listed with CM 740 and CS 795) ECE 632 Multivariable Control Systems 	 ECE 627 Register- transfer-level Digital Systems ECE 637 Digital Integrated Circuits Computer Software ECE 606 Algorithm Design and Analysis or CO 602 Fundamentals of Optimization (cross- listed with CM 740 and CS 705) or CS 666 Algorithm Design and Analysis ECE 652 Methods and Principles of Safety- critical Embedded Software ECE 653 Software Testing, Quality Assurance and Maintenance or CS 647 Software Testing, Quality Assurance and Maintenance ECE 654 Software ECE 656 Database Systems ECE 657 A Data and Knowledge Modelling and Analysis or CS 680 Introduction to Machine Learning or CS 680 Introduction to Artificial Intelligence ECE 655 The Mathematics of Public- Key Cryptography or CS 655 Computer Security and Privacy or CO 687 Applied Cryptography or CS 658 Computer Security and Privacy or CO 687 Applied Cryptography or CS 658 Computer Security and Privacy or CO 687 Applied Cryptography or CS 658 Computer Security and Privacy or CO 687 Applied Cryptography or CS 658 Computer Security and Privacy or CO 687 Applied Cryptography

Current PhD in Electrical and Computer Graduate	Proposed PhD in Electrical and Computer
Studies Academic Calendar content:	Engineering - Aeronautics Graduate Studies
	Academic Calendar content:
ECE 686 Filtering and	- FCF 672 Optoelectropic
Control of Stochastic	Devices
	- DAMI Dottorn Apolysis and
Linear Systems	- Pattern Analysis and
 ECE 688 Nonlinear 	Machine Intelligence
Systems	- ECE 606 Algorithm
 VLSI - Very Large Scale 	Design and Analysis
Integration	- ECE 613 Image
■ ECE 636 Advanced	Processing and Visual
Appleg Integrated	Communication
Analog megialeu	
Circuits	+ EUE 037 100IS 01
 ECE 637 Digital 	Intelligent Systems
Integrated Circuits	
 ECE 642 Radio 	 ECE 657A Data and
Frequency Integrated	Knowledge Modelling
Circuit Design	and Analysis
ECE 671 Microwave and	= ECE 650 Intelligent
RF Engineering	Sensors and Sensor
 Wireless Communication 	Networks
 ECE 602 Introduction to 	 Power and Energy Systems
Optimization or CO 602	- ECE 662 Power
Fundamentals of	Systems Analysis and
Optimization (cross-	Control
listed with CM 740 and	- FCF 663 Energy
CS 795)	Processing
ECE 603 Statistical	ECE 665 High Voltage
- EOE 000 Statistical	Engineering Applications
Signal Flocessing	
ECE 604 Stochastic	+EUE 000 Power
Processes	Systems Operation
ECE 610 Broadband	ECE 668 Distribution
Communication	System Engineering
Networks	ECE 760 Special Topics
 ECE 611 Digital 	in Power Systems and
Communications	High Voltage
ECE 612 Information	Engineering (topic 11
Theory	Power System
	Protection and Poloving)
ECE 013 IIIage	er ECE 765 Dewer
	UI EUE 700 FUWEI
Communication	System Protection and
	Relaying
• PhD Comprehensive Examination I and PhD	- Quantum Information
Comprehensive Examination II	 ECE 676 Quantum
 Students are required to meet the 	Information Processing
University-level PhD Comprehensive	Devices (cross-listed
Examination minimum requirements	with QIC 750)
outlined in the "Minimum requirements	= ECE 677 Ouentum
for the PhD degree" soction of the	Electronics and
Graduata Studiaa Academia Calendar	Destances (areas listed
(GSAC), with certain noted differences	With QIC 885)
that are specific to the Faculty of	- QIC 710 Quantum
Engineering Comprehensive	Information Processing
Examination minimum requirements:	 Silicon Devices and Integrated
 Comprehensive examination 	Circuits
purpose: Consistent with	

Current PhD in Electrical and Computer Graduate	Proposed PhD in Electrical and Computer
	Academic Calendar content:
University-level minimum requirements.	 ECE 630 Physics and Models of
 Who Chairs an examination: 	Semiconductor Devices
Students must follow the	- ECE 631 Microelectronic
Faculty of Engineering Chair	Processing Technology
guidelines whereby the Chair is	- ECE 634 Organic
normally selected from outside	Electronics
of the student's home	+ ECE 636 Advanced
department.	Analog Integrated
 Format / Content: Consistent 	Circuits
with University-level minimum	- ECE 642 Radio
requirements but with additional	Frequency Integrated
information provided in the	Circuit Design
Faculty of Engineering	- ECE 672 Optoelectronic
Comprehensive Examination	Devices
minimum requirements.	
 Academic integrity: Consistent 	- ECE 602 Introduction to
with University-level minimum	Optimization or CO 602
requirements.	Fundamentals of
\circ In addition to the University-level and	Optimization (cross-
Faculty-level PhD Comprehensive	listed with CM 740 and
Examination minimum requirements.	CS 795)
students in the PhD in Electrical and	- ECE 604 Stochastic
Computer Engineering program are	Processes
also required to meet the following	ECE 682 Multivariable
requirements:	Control Systems
 Students must complete the 	ECE 686 Filtering and
Background Comprehensive	Control of Stochastic
Examination and the	Linear Systems
Comprehensive Proposal	ECE 688 Nonlinear
Examination which are	Systems
conducted by the Department	- VLSI - Very Large Scale
for each candidate.	Integration
 The first exam, the Background 	+ ECE 636 Advanced
Comprehensive Examination.	Analog Integrated
will be held before the end of	Circuits
the third term (fourth term if	- ECE 637 Digital
from an incomplete MASc). The	Integrated Circuits
main objective of this	- ECE 642 Radio
examination is to satisfy the	Frequency Integrated
Department that the candidate	Circuit Design
has a broad knowledge of their	ECE 671 Microwave and
field and a thorough technical	RF Engineering
background to pursue their	Wireless Communication
research: the candidate will be	ECE 602 Introduction to
guestioned on their background	Optimization or CO 602
preparation.	Fundamentals of
 The second exam. the 	Optimization (cross-
Comprehensive Proposal	listed with CM 740 and
Examination will be held no	<u>CS 795)</u>
later than the student's sixth	ECE 603 Statistical
term and only after the	Signal Processing
Background Comprehensive	= FCF 604 Stochastic
Examination has been	Processes

Current PhD in Electrical and Computer Graduate	Proposed PhD in Electrical and Computer
Studies Academic Calendar content:	Engineering - Aeronautics Graduate Studies
	Academic Calendar content:
successfully completed. The	ECE 610 Broadband
main objective of this	Communication
examination is to examine and	Networks
approve the thesis proposal.	 ECE 611 Digital
 The result of these 	Communications
examinations is the	 ECE 612 Information
identification of an Advisory	Theory
Committee which has examined	- ECE 613 Image
and approved the candidate's	Processing and Visual
background and thesis proposal	Communication
and is willing to assist the	
supervisor with the subsequent	• PhD Comprehensive Examination I and PhD
research program. The validity	Comprehensive Examination II
of the comprehensive	 Students are required to meet the
examination expires after three	University-level PhD Comprehensive
years.	
 Students who do not complete sith an Osmanna hanairea 	outlined in the "Minimum requirements
Examination by the stated	for the PhD degree Section of the
deadling, or fail aither even on	
their accord attempt will be	(GSAC), with certain noted differences
required to withdraw from the	Engineering Comprehensive
program	Engineering Comprehensive
The Background	Comprehensive examination
Comprehensive Examination	purpose: Consistent with
Committee does not include the	University-level minimum
supervisor(s) and must consist	requirements
of three members of the	 Who Chairs an examination.
University, one of whom must	Students must follow the
be from ECE and two of whom	Faculty of Engineering Chair
can be internal or external to	guidelines whereby the Chair is
ECE (but within the University of	normally selected from outside
Waterloo). The Proposal	of the student's home
Comprehensive Examination	department.
Committee must consist of	 Format / Content: Consistent
the supervisor(s) plus three	with University-level minimum
members of the University, two	requirements but with additional
of whom must be from ECE and	information provided in the
one of whom must be external	Faculty of Engineering
to ECE (but within the University	Comprehensive Examination
of Waterloo). It is the	minimum requirements.
supervisor's responsibility to	 Academic integrity: Consistent
form each of these committees.	with University-level minimum
 Detailed procedures are available in the "Db D common to a size comministic median 	requirements.
"PnD comprehensive examination	 In addition to the University-level and Exactly level DbD. Communication
process section of the Electrical and	Faculty-level PhD Comprehensive
	Examination minimum requirements,
 DhD Seminar 	Suuenis in the PhD in Electrical and
\circ The sim of the seminar is to allow	program are also required to meet the
students to gain experience in	following requirements:
nreparing and presenting their work	Students must complete the
The seminar is to be held no later than	Background Comprehensive
the end of the third year (ninth term)	Examination and the

 after the initial registration in the program. The seminar must be attended by the student's supervisor and their Advisory Committee. Other Faculty members and PhD and MASc students may also be in attendance. Since this is not intended to be an examination, the seminar presentation and the feedback communication, would be regarded as satisfying the seminar orcel requirements. Students who do not complete the PhD Seminar by the stated deadline will be required to withdraw from the program. PhD Thesis The primary objective of the program is the accomplishment of independent and original research work and reporting thereon in a research thesis. The requirements for the PhD degree are completed when the student successfully defends their thesis before an Examination Committee. This committee should consist of the supervisor, three other members of the University (at least one of whom should be from outside the Department are counted as departmental members in defining examining committees. The requirements in the Department are counted as departmental members in defining examining committees. Students who do not complete succeased by the subsequent research who do not complete succeased and approve the thesis proposal and is willing to assist the supervisor with the subsequent research program. The validity of the comprehensive examination of and thesis proposal and is willing to assist the supervisor with the subsequent research program. The validity of the comprehensive examination of the supervisor with the subsequent research program. The validity of the comprehensive examination or their second attempt, will be required to withdraw from the program. 	Current PhD in Electrical and Computer Graduate Studies Academic Calendar content:	Proposed PhD in Electrical and Computer Engineering - Aeronautics Graduate Studies
 The Background Comprehensive Examination Committee does not include the supervisor(s) and must consist of three members of the 	after the initial registration in the program. The seminar must be attended by the student's supervisor and their Advisory Committee. Other Faculty members and PhD and MASc students may also be in attendance. Since this is not intended to be an examination, the seminar presentation and the feedback communication, would be regarded as satisfying the seminar credit requirements. • Students who do not complete the PhD Seminar by the stated deadline will be required to withdraw from the program. • PhD Thesis • The primary objective of the program is the accomplishment of independent and original research work and reporting thereon in a research thesis. • The requirements for the PhD degree are completed when the student successfully defends their thesis before an Examination Committee. This committee should consist of the supervisor, three other members of the University (at least one of whom should be from outside the Department) and an external examiner. Faculty from other Departments who hold cross appointments in the Department are counted as departmental members in defining examining committees.	Academic Calendar content: Comprehensive Proposal Examination which are conducted by the Department for each candidate. The first exam, the Background Comprehensive Examination, will be held before the end of the third term (fourth term if from an incomplete MASc). The main objective of this examination is to satisfy the Department that the candidate has a broad knowledge of their field and a thorough technical background to pursue their research; the candidate will be questioned on their background preparation. The second exam, the Comprehensive Proposal Examination, will be held no later than the student's sixth term and only after the Background Comprehensive Examination has been successfully completed. The main objective of this examination is to examine and approve the thesis proposal. The result of these examinations is the identification of an Advisory Committee which has examined and approved the candidate's background and thesis proposal and is willing to assist the supervisor with the subsequent research program. The validity of the comprehensive Examination by the stated deadline, or fail either exam on their second attempt, will be required to withdraw from the program. The Background Committee does not include the supervisor(s) and must consist of three members of the

Current PhD in Electrical and Computer Graduate	Proposed PhD in Electrical and Computer
Studies Academic Calendar content:	Engineering - Aeronautics Graduate Studies
	Academic Calendar content:
	Academic Calendar content: be from ECE and two of whom can be internal or external to ECE (but within the University of Waterloo). The Proposal Comprehensive Examination Committee must consist of the supervisor(s) plus three members of the University, two of whom must be from ECE and one of whom must be external to ECE (but within the University of Waterloo). It is the supervisor's responsibility to form each of these committees. o Detailed procedures are available in the "PhD comprehensive examination process" section of the Electrical and
	Computer Engineering website
	 PhD Seminar The aim of the seminar is to allow students to gain experience in preparing and presenting their work. The seminar is to be held no later than the end of the third year (ninth term) after the initial registration in the program. The seminar must be attended by the student's supervisor and their Advisory Committee. Other Faculty members and PhD and MASc students may also be in attendance. Since this is not intended to be an examination, the seminar presentation and the feedback communication, would be regarded as satisfying the seminar credit requirements. Students who do not complete the PhD Seminar by the stated deadline will be required to withdraw from the program.
	 PhD Thesis The primary objective of the program is the accomplishment of independent and original research work and reporting thereon in a research thesis. The requirements for the PhD degree are completed when the student successfully defends their thesis before an Examination Committee. This committee should consist of the supervisor, three other members of the University (at least one of whom should be from outside the Department) and an external examiner. Faculty from

Current PhD in Electrical and Computer Graduate Studies Academic Calendar content:	Proposed PhD in Electrical and Computer Engineering - Aeronautics Graduate Studies Academic Calendar content:
	other Departments who hold cross appointments in the Department are counted as departmental members in defining examining committees.

Current students will be permitted to change program to the Collaborative Aeronautics Program.

Department/School approval date (mm/dd/yy): 02/16/2023 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 05/08/23 Faculty approval date (mm/dd/yy): Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy): Senate approval date (mm/dd/yy) (if applicable):



Graduate Studies Program Revision Template

Prior to form submission, review the <u>content revision instructions</u> and information regarding <u>major/minor</u> <u>modifications</u>. For questions about the form submission, contact <u>Trevor Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Program: Master of Applied Science (MASc) in Electrical and Computer Engineering - Aeronautics

Program contact name(s): Christopher Nielsen, Jared Rank

Form completed by: Christopher Nielsen, Jared Rank

Description of proposed changes:

Note: changes to courses and milestones also require the completion/submission of the <u>SGRC Graduate Studies</u> <u>Course/Milestone Form</u>.

The Department of Electrical and Computer Engineering is joining the Collaborative Aeronautics Program (CAP) and is thus adding a Master of Applied Science (MASc) in Electrical and Computer Engineering - Aeronautics program.

Is this a major modification to the program? Yes

Rationale for change(s):

After consultation with the ECE Graduate Studies Committee, which consists of Faculty and Graduate Student representatives, the Department of Electrical and Computer Engineering is joining the Collaborative Aeronautics Program. Joining the CAP aligns with research that is already being conducted by faculty and graduate students in this area.

Proposed effective date: Term: Winter Year: 2024

Current <u>Graduate Studies Academic Calendar (GSAC)</u> page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-electrical-and-computerengineering

Current MASc in Electrical and Computer	Proposed MASc in Electrical and Computer
Engineering Graduate Studies Academic Calendar	Engineering - Aeronautics Graduate Studies
content:	Academic Calendar content:
MASTER OF APPLIED SCIENCE	MASTER OF APPLIED SCIENCE
(MASC) IN ELECTRICAL AND	(MASC) IN ELECTRICAL AND
COMPUTER ENGINEERING	COMPUTER ENGINEERING -
Graduate research fields	AERONAUTICS
Antennas, Microwaves and Wave OpticsBiomedical	Graduate research fields Antennas, Microwaves and Wave Optics Biomedical

Current MASc in Electrical and Computer	Proposed MASc in Electrical and Computer
Engineering Graduate Studies Academic Calendar	Engineering - Aeronautics Graduate Studies
content:	Academic Calendar content:
 Circuits and Systems Including Computer - 	 Circuits and Systems Including Computer -
Aided Design	Aided Design
 Communications and Information Systems 	 Communications and Information Systems
Computer Hardware	 Computer Hardware
Computer Software	Computer Software
Nanotechnology	 Nanotechnology
 Pattern Analysis and Machine Intelligence 	 Pattern Analysis and Machine Intelligence
(PAMI)	(PAMI)
 Power and Energy Systems 	 Power and Energy Systems
Quantum Information	Quantum Information
Silicon Devices and Integrated Circuits	 Silicon Devices and Integrated Circuits
Systems and Control	Systems and Control
Very Large Scale Integration (VLSI)	 Very Large Scale Integration (VLSI)
Wireless Communication	 Wireless Communication
Program information	Program information
• Admit term(s)	• Admit term(s)
• Winter	o Winter
o opinig	o opinig
Delivery mode	Delivery mode
• On-campus	
Length of program	Length of program
• The minimum period of registration for	• The minimum period of registration for
the Master's degree is two terms after	the Master's degree is two terms after
an Honours Bachelor's degree or	an Honours Bachelor's degree or
equivalent. The maximum time limit is	equivalent. The maximum time limit is
six terms for the regular program and	six terms for the regular program and
fifteen terms for the part-time program.	fifteen terms for the part-time program.
Extensions beyond six terms must be	Extensions beyond six terms must be
approved by the Faculty Graduate	approved by the Faculty Graduate
Studies Office.	Studies Office.
- Brogram tura	
Program type Mosteria	Program type Oallak anating
o Master s	• Collaborative
- Projectration option(a)	o Research
• Registration option(s)	Desistration antion(s)
• Full-unite	Registration option(s)
	• Full-liffle
 Study ontion(s) 	
• Study option(s)	Study option(a)
	• Sludy option(s)
Admission requirements	0 11153
Aumission requirements	Admission requirements
Minimum requiremente	Aumission requirements
Willing in requirements The Department of Electrical and	Minimum requiremente
Computer Engineering requires ofther	Willing requirements The Department of Electrical and
(i) a 75% overall standing in the last	• The Department of Electrical and Computer Engineering requires either
1 (1) a 7.570 Over all starbully in the last	

Current MASc in Electrical and Computer	Proposed MASc in Electrical and Computer
Engineering Graduate Studies Academic Calendar	Engineering - Aeronautics Graduate Studies
content:	Academic Calendar content:
content:two years, or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent or (ii) a 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent, as the minimum requirement for admission to a Master's program for applicants educated at a Canadian institution. A 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent is the minimum requirement four-year Honours Bachelor's degree or equivalent is the minimum requirement for admission to a Master's program for applicants educated outside of Canada.oAt the time of admission, each student	Academic Calendar content: (i) a 75% overall standing in the last two years, or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent or (ii) a 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent, as the minimum requirement for admission to a Master's program for applicants educated at a Canadian institution. A 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent is the minimum requirement for admission to a Master's program for applicants educated outside of Canada.
must have a faculty supervisor who has endorsed the recommendation for admission.	 At the time of admission, each student must have a faculty supervisor who has endorsed the recommendation for admission.
Application materials	
 Résumé Supplementary information form Transcript(s) 	 Application materials Résumé Supplementary information form Transcript(s)
Keterences	- Poforonooo
 Number of references: 2 Type of references: at least 1 academic 	 References Number of references: 2 Type of references: at least 1 academic
English language proficiency (ELP) (if applicable)	English language proficiency (ELP) (if applicable)
Degree requirements	Degree requirements
Graduate Academic Integrity Module (Graduate AIM)	Graduate Academic Integrity Module (Oraduate Alla)
• Courses	(Graduate AIM)
 The requirements for the program consist of at least 5 courses (0.50 unit weight per course) of graduate credit. A minimum of 3 courses must be taken from within the Faculty of Engineering. A maximum of 2 courses may be taken from outside the Faculty but must be from the Faculties of Math and/or Science. At least 2 of the courses must be from the list of approved core courses (updated by the Department annually) in one of the approved areas of specialization as specified in the student's letter of admission. All MASc 	Courses Students must obtain The requirements for the program consist of at least <u>6</u> courses (0.50 unit weight per course) of graduate credit including 2 Aeronautics <u>core courses</u> . A minimum of 3 courses must be taken from within the Faculty of Engineering. A maximum of 2 courses may be taken from outside the Faculty but must be from the Faculties of Math and/or Science. At least 2 courses must be from the list of approved core courses (updated by the Department annually) in one of the
of specialization as specified in the student's letter of admission. All MASc students are required to take a	approved core courses (updated by Department annually) in one of the approved areas of specialization as

Current MASc in Electrical and Computer	Proposed MASc in Electrical and Computer
Engineering Graduate Studies Academic Calendar	Engineering - Aeronautics Graduate Studies
	Academic Calendar content:
Current MASc in Electrical and Computer Engineering Graduate Studies Academic Calendar content: minimum of 2 ECE courses toward their degree requirements. Core courses may count towards this 2 course minimum. The choice of courses must meet with the approval of the supervisor. • Core courses: • Antennas, Microwaves, and Wave Optics • ECE 642 Radio Frequency Integrated Circuit Design • ECE 671 Microwave and RF Engineering • ECE 672 Optoelectronic Devices • ECE 675 Radiation and Propagation of Electromagnetic Fields • Biomedical • ECE 601 Foundations of Biology in Engineering • ECE 607 Fundamentals of Ultrasonics • ECE 608 Quantitative Methods in Biomedical Engineering • ECE 609 Engineering Analysis of Living Cells • Circuits and Systems • ECE 637 Digital Integrated Circuits • ECE 642 Radio Frequency Integrated Circuits • ECE 642 Radio	Proposed MASc in Electrical and Computer Engineering - Aeronautics Graduate Studies Academic Calendar content: specified in the student's letter of admission. All MASe Students are required to take a minimum of 2 ECE courses toward their degree requirements. Core courses may count towards this 2-course minimum. The choice of courses must meet with the approval of the supervisor. • Aeronautics core courses: • AVIA 601 Interdisciplinary <u>Aeronautics</u> • AVIA 601 Interdisciplinary <u>Aeronautics</u> • AVIA 601 Interdisciplinary <u>Aeronautics</u> • AVIA 601 & AVIA 602, only courses from the Faculties of Science, Math and Engineering are permitted. • ECE core courses: • Antennae, Microwaves, and Wave Optics • ECE 642 Radio Frequency Integrated Circuit Design • ECE 671 Microwave and RF-Engineering • ECE 672 Optoelectronic Devices • ECE 672 Optoelectronic Devices • ECE 601 Foundations of Biology in Engineering • ECE 601 Foundations of Biology in Engineering
 Engineering ECE 609 Engineering Analysis of Living Cells Circuits and Systems ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio 	
 Frequency Integrated Circuit Design ECE 671 Microwave and RF Engineering Communications and Information Systems ECE 602 Introduction to Optimization or CO 602 Fundamentals of Optimization (cross- listed with CM 740 and CS 795) ECE 603 Statistical Signal Processing ECE 604 Stochastic Processes 	Engineering - ECE 609 Engineering Analysis of Living Cells - Circuits and Systems - ECE 636 Advanced Analog Integrated Circuits - ECE 637 Digital Integrated Circuits - ECE 642 Radio Frequency Integrated Circuit Design - ECE 671 Microwave and RF Engineering - Communications and Information Systems - ECE 602 Introduction to Optimization or CO 602

Current MASc in Electrical and Computer	Proposed MASc in Electrical and Computer
Engineering Graduate Studies Academic Calendar content:	Engineering - Aeronautics Graduate Studies Academic Calendar content:
ECE 610 Broadband	Eundamentals of
Communication	Ontimization (cross-
Networks	listed with CM 740 and
- ECE 611 Digital	
ECE 612 Information	Signal Processing
Ineory	•ECE 604 Stochastic
 ECE 613 Image 	Processes
Processing and Visual	ECE 610 Broadband
Communication	Communication
 Computer Hardware 	Networks
 ECE 606 Algorithm 	=ECE 611 Digital
Design	Communications
 ECE 621 Computer 	 ECE 612 Information
Organization	Theory
 ECE 627 Register- 	■ ECE 613 Image
transfer-level Digital	Processing and Visual
Systems	Communication
 ECE 637 Digital 	- Computer Hardware
Integrated Circuits	ECE 606 Algorithm
 Computer Software 	
 ECE 606 Algorithm 	ECE 621 Computer
Design and Analysis or	Organization
CO 602 Fundamentals	- ECF 627 Register-
of Optimization (cross-	transfer-level Digital
listed with CM 740 and	Systems
CS 795) or CS 666	ECE 637 Digital
Algorithm Design and	Integrated Circuits
Angonana Design and	
 ECE 652 Methods and 	ECE 606 Algorithm
Principles of Safety-	Design and Analysis or
critical Embedded	$C \cap 602$ Fundamentals
Software	of Ontimization (cross-
 ECE 653 Software 	listed with CM 740 and
Testing Quality	CS 705) or CS 666
Accurace and	Algorithm Docign and
Assulance and Mointenance or CS 647	Angonum Design and
Software Testing	- CCE 652 Mathada and
Ouclity Accurace and	- ECE 002 WELLIOUS difu
Quality Assurance, and Mointenance	eritical Embedded
 ECE 654 Software Delie bility Francisco evidence 	Software
Reliability Engineering	
ECE 656 Database	Hesting, Quality
Systems	Assurance and
• ECE 65/A Data and	Maintenance or CS 647
Knowledge Modelling	Software Testing,
and Analysis or CS 680	Quality Assurance, and
Introduction to Machine	Maintenance
Learning or CS 686	- ECE 654 Software
Introduction to Artificial	Reliability Engineering
Intelligence	ECE 656 Database
 CO 685 The 	Systems
Mathematics of Public-	 ECE 657A Data and
Key Cryptography or CS	Knowledge Modelling

Current MASc in Electrical and Computer Engineering Graduate Studies Academic Calendar	Proposed MASc in Electrical and Computer Engineering - Aeronautics Graduate Studies
content:	Academic Calendar content:
658 Computer Security and Privacy or CO 687 Applied Cryptography	and Analysis or CS 680 Introduction to Machine Learning or CS 686
 Nanotechnology 	Introduction to Artificial
 ECE 630 Physics and Models of 	Intelligence
Semiconductor Devices	Mathematics of Public-
 ECE 633 Nanoelectronics 	Key Cryptography or CS 658 Computer Security
 ECE 634 Organic 	and Privacy or CO 687
Electronics	Applied Cryptography
 ECE 635 Fabrication in 	- Nanotechnology
the Nanoscale:	ECE 630 Physics and
Principles, Technology	Models of
and Applications	
ECE 672 Optoelectronic Devisee	+
 Devices PAMI - Pattern Analysis and 	ECE 634 Organic
Machine Intelligence	Electronics
 ECE 606 Algorithm 	ECE 635 Fabrication in
Design and Analysis	the Nanoscale:
 ECE 613 Image 	Principles, Technology
Processing and Visual	and Applications
Communication	- ECE 672 Optoelectronic
 ECE 657 Tools of 	Devices
Intelligent Systems	 PAMI - Pattern Analysis and Machine Intelligence
ECE 6574 Data and	ECE 606 Algorithm
Knowledge Modelling	Design and Analysis
and Analysis	ECE 613 Image
 ECE 659 Intelligent 	Processing and Visual
Sensors and Sensor Networks	Communication - ECE 657 Tools of
 Power and Energy Systems 	Intelligent Systems
 ECE 662 Power 	Design
Systems Analysis and	ECE 657A Data and
	Knowledge Modelling
 ECE 003 Ellelgy Processing 	ECE 650 Intelligent
 ECE 665 High Voltage 	Sensors and Sensor
	Networks
 ECE 666 Power 	 Power and Energy Systems
Systems Operation	- ECE 662 Power
 ECE 668 Distribution System Engineering 	Systems Analysis and Control
 ECE 760 Special Topics 	- ECE 663 Energy
in Power Systems and	Processing
High Voltage	ECE 665 High Voltage
Engineering (topic 11	Engineering Applications
Power System	- ECE 666 Power
Protection and Relaying)	Systems Operation
OF ECE /65 POWER	- EUE 668 UISTRIDUTION
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Engineering Graduate Studies Academic Calendar content: content: • Quantum Information • CDE 676 Quantum Information Processing Devices (cross-listed with QL C85) • ECE 677 Quantum Electronics and Photonics (cross-listed with QL C85) • QIC 710 Quantum Information Processing • OIC 710 Quantum Information Processing • ECE 630 Physics and Models of Circuits • ECE 630 Physics and Models of Circuits • ECE 630 Physics and Models of Circuits • ECE 630 Advanced Analog Integrated Circuits • ECE 634 Advanced Analog Integrated Circuits • ECE 632 Radio Frequency Integrated Circuits • ECE 672 Optoelectronic Devices • ECE 663 Nutivariable Circuits • ECE 672 Optoelectronic Devices • ECE 663 Nutivariable Circuits • ECE 672 Optoelectronic Devices • ECE 663 Advanced Analog Integrated Circuits • ECE 664 Stochastic Processes • ECE 663 Advanced Analog Integrated Circuits • ECE 664 Stochastic Processes • ECE 666 Filtering and Control Stochastic Linear Systems • ECE 668 Advanced Analog Integrated Circuits • ECE 663 Advanced Analog Integrated Circuits • ECE 663 Advanced Analog Integrated Circuits • ECE 663 Advanced Analog Integrated Circ	Current MASc in Electrical and Computer	Proposed MASc in Electrical and Computer
content: Acidemic Calendar content: • Quantum Information - ECE 760 Special Topics • Divices (cross-listed with QIC 750) - ECE 677 Quantum Engineering (cipic 11 Power Systems and High Voltage • Photonics (cross-listed with QIC 780) - ECE 677 Quantum Proteesting and with QIC 780 (consultation Processing Circuits • Silicon Devices and Integrated Circuits - ECE 677 Quantum Information Processing Circuits • ECE 630 Physics and Models of Semiconductor Devices and Integrated Circuits - ECE 677 Quantum Information Processing Technology • ECE 630 Advanced Analog Integrated Circuit Design - ECE 630 Physics and Models of Semiconductor Devices and Integrated Circuit Design • ECE 642 Radio Frequency Integrated Circuit Design - ECE 630 Physics and Models of Semiconductor Devices and Integrated Circuits • ECE 642 Radio Frequency Integrated Circuit Design - ECE 630 Physics and Models of Semiconductor Devices and Integrated Circuits • ECE 642 Radio Frequency Integrated Circuit Design - ECE 630 Physics and Models of Semiconductor Devices and Integrated Circuits • ECE 642 Radio Frequency Integrated Circuit Design - ECE 630 Physics and Models of Semiconductor Devices and Integrated Circuits • ECE 642 Radio Frequency Integrated Circuit Design - ECE 630 Physics and Models of Semiconductor Devices and Integrated Circuits • ECE 642 Radio Frequency Integrated Circuit Design - ECE 642 Radio Frequency Integrated Ci	Engineering Graduate Studies Academic Calendar	Engineering - Aeronautics Graduate Studies
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Fundamentals of Circuits Optimization (cross- listed with CM 740 and Frequency Integrated CS 795) ECE 642 Radio ECE 604 Stochastic ECE 672 Optoelectronic Processes Devices ECE 682 Multivariable Systems and Controls Control Systems ECE 686 Filtering and Control of Stochastic Fundamentals of Linear Systems Optimization or CO 602 Fundamentals of Systems ECE 688 Nonlinear Systems Systems Systems ECE 636 Advanced ECE 682 Multivariable Analog Integrated Control Systems ECE 637 Digital Control Systems ECE 637 Digital Control Systems ECE 642 Radio ECE 688 Nonlinear Circuits ECE 686 Filtering and Control Systems ECE 686 Advanced Analog Integrated Control Systems ECE 642 Radio ECE 688 Nonlinear ECE 642 Radio ECE 688 Nonlinear	Optimization or CO 602	Analog Integrated
 Optimization (cross- listed with CM 740 and CS 795) ECE 604 Stochastic Processes ECE 604 Stochastic Processes ECE 682 Multivariable Control Systems ECE 686 Filtering and Control of Stochastic Linear Systems ECE 688 Nonlinear Systems ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio Fundamentals of Optimization or CO 602 Fundamentals of Optimization (cross- listed with CM 740 and CS 795) VLSI - Very Large Scale Integration ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio 	Fundamentals of	Circuits
listed with CM 740 and CS 795) Frequency-Integrated Circuit Design ECE 604 Stochastic Processes	Optimization (cross-	- ECE 642 Radio
 CS 795) ECE 604 Stochastic Processes ECE 682 Multivariable Control Systems ECE 682 Multivariable Control Systems ECE 686 Filtering and Control of Stochastic Linear Systems ECE 688 Nonlinear Systems VLSI - Very Large Scale Integration ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio ECE 642 Radio 	listed with CM 740 and	Frequency Integrated
 ECE 604 Stochastic Processes ECE 682 Multivariable Control Systems ECE 682 Multivariable Control Systems ECE 686 Filtering and Control of Stochastic Linear Systems ECE 688 Nonlinear Systems VLSI - Very Large Scale Integration ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio ECE 642 Radio ECE 648 Nonlinear ECE 642 Radio 	CS 795)	Circuit Design
Processes Devices ECE 682 Multivariable - Systems and Controls Control Systems - ECE 602 Introduction to Optimization or CO 602 - Fundamentals of Control of Stochastic - Fundamentals of Linear Systems - Optimization (cross-listed with CM 740 and Systems - ECE 604 Stochastic Integration - ECE 636 Advanced Analog Integrated - ECE 686 Filtering and Circuits - ECE 636 Filtering and ECE 637 Digital - ECE 688 Nonlinear Integrated Circuits - ECE 688 Nonlinear ECE 642 Radio - ECE 688 Nonlinear	 ECE 604 Stochastic 	 ECE 672 Optoelectronic
 ECE 682 Multivariable Control Systems ECE 686 Filtering and Control of Stochastic Linear Systems ECE 688 Nonlinear Systems VLSI - Very Large Scale Integration ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio ECE 642 Radio ECE 688 Nonlinear Systems 	Processes	Devices
 Control Systems ECE 602 Introduction te Optimization or CO 602 Control of Stochastic Linear Systems ECE 688 Nonlinear Systems VLSI - Very Large Scale Integration ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio ECE 642 Radio 	 ECE 682 Multivariable 	 Systems and Controls
 ECE 686 Filtering and Control of Stochastic Linear Systems ECE 688 Nonlinear Systems VLSI - Very Large Scale Integration ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio ECE 642 Radio Optimization or CO 602 Fundamentals of Optimization (cross- listed with CM 740 and CS 795) VLSI - Very Large Scale Integrated Control Systems ECE 636 Advanced Analog Integrated Control Systems ECE 688 Filtering and Control of Stochastic Linear Systems ECE 642 Radio 	Control Systems	 ECE 602 Introduction to
Control of Stochastic Linear SystemsFundamentals of Optimization (cross- listed with CM 740 and CS 795)• VLSI - Very Large Scale Integration• ECE 604 Stochastic Processes• ECE 636 Advanced Analog Integrated Circuits• ECE 682 Multivariable Control Systems• ECE 637 Digital Integrated Circuits• ECE 642 Radio• ECE 642 Radio• ECE 642 Radio	 ECE 686 Filtering and 	Optimization or CO 602
Linear Systems ECE 688 Nonlinear Systems VLSI - Very Large Scale Integration ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio Control of Stochastic Linear Systems ECE 688 Nonlinear Control of Stochastic Linear Systems ECE 688 Nonlinear	Control of Stochastic	Fundamentals of
 ECE 688 Nonlinear Systems VLSI - Very Large Scale Integration ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio ECE 688 Nonlinear 	Linear Systems	Optimization (cross-
Systems CS 795) VLSI - Very Large Scale	 ECE 688 Nonlinear 	listed with CM 740 and
 VLSI - Very Large Scale Integration ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio 	Systems	CS 795)
Integration Processes • ECE 636 Advanced - ECE 682 Multivariable Analog Integrated Circuits - ECE 686 Filtering and • ECE 637 Digital Integrated Circuits - ECE 688 Nonlinear • ECE 642 Radio - ECE 688 Nonlinear	 VLSI - Very Large Scale 	- ECE 604 Stochastic
 ECE 636 Advanced Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 637 Digital Linear Systems ECE 642 Radio 	Integration	Processes
Analog Integrated Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio Control Systems <u>Control Systems</u> <u>ECE 686 Filtering and</u> <u>Control of Stochastic</u> <u>Linear Systems</u> <u>ECE 688 Nonlinear</u>	ECE 636 Advanced	ECE 682 Multivariable
Circuits ECE 637 Digital Integrated Circuits ECE 642 Radio ECE 642 Radio Control of Stochastic Linear Systems ECE 688 Nonlinear	Analog Integrated	Control Systems
ECE 637 Digital Integrated Circuits ECE 642 Radio	Circuits	ECE 686 Filtering and
Integrated Circuits ECE 642 Radio ECE 642 Radio	FCF 637 Digital	Control of Stochastic
ECE 642 Radio ECE 642 Radio	Integrated Circuite	Linear Systems
Fraduancy Integrated Systems	- LUL 042 Naulu Erequency Integrated	- LUL 000 NUTHINEAL
Circuit Design	Circuit Design	oyotems

Current MASc in Electrical and Computer Engineering Graduate Studies Academic Calendar content:	Proposed MASc in Electrical and Computer Engineering - Aeronautics Graduate Studies Academic Calendar content:
ECE 671 Microwave and RF Engineering	
 Wireless Communication 	- ECE 636 Advanced
 ECE 602 Introduction to 	Analog Integrated
Optimization or CO 602	Circuits
Fundamentals of	- ECE 637 Digital
Optimization (cross-	Integrated Circuits
listed with CM 740 and	- ECE 642 Radio
CS 795)	Frequency Integrated
 ECE 603 Statistical 	Circuit Design
Signal Processing	 ECE 671 Microwave and
 ECE 604 Stochastic 	RF Engineering
Processes	 Wireless Communication
 ECE 610 Broadband 	 ECE 602 Introduction to
Communication	Optimization or CO 602
Networks	Fundamentals of
 ECE 611 Digital 	Optimization (cross-
Communications	listed with CM 740 and
ECE 612 Information	CS 795)
I heory	+ECE 603 Statistical
 ECE 613 Image 	Signal Processing
Processing and Visual	=EUE 004 Stochastic
Communication	Frocesses
 Students are normally expected to take graduate sources at the 600 or 700 	
graduate courses at the 000 of 700	Notworko
level. Tadvariced undergraduate (400	- ECE 611 Digital
Engineering course may be allowed for	
araduate credit. It is expected that both	ECE 612 Information
the student and supervisor should	Theory
provide adequate justification and	- ECE 613 Image
complete the required paperwork	Processing and Visual
before any undergraduate course is	Communication
approved for credit.	 Students are normally expected to take
 The advanced undergraduate courses 	graduate courses at the 600 or 700
must be at the 400 or 500 level as	level or higher as per the Graduate
given in the Undergraduate Studies	Studies Academic Calendar.
Academic Calendar and must be	 <u>One (1)</u> advanced undergraduate (<u>at</u>
approved for graduate credit and	<u>the</u> 400 <u>or 500</u> leve <u>l as per the</u>
confirmed in writing by the Department	Undergraduate Studies Academic
Associate Chair for Graduate Studies at	<u>Calendar</u>) Electrical or Computer
the time of registration.	Engineering course may be <u>permitted</u>
 Students may be required at any time 	for graduate credit. It is expected that
to withdraw from the program if they fail	Both the student and supervisor should
to maintain a minimum grade of 65% in	must provide adequate justification and
each of the 5 courses and a cumulative	complete the required paperwork
average of at least /0% in the	perore any undergraduate course is
coursework portion of their approved	approved for credit.
study program or if they fall to receive	 I ne advanced undergraduate courses
sausiactory progress reports regarding	must de at the 400 or 500 level as
The Department may recommend that	given in the Undergraduate Studies
 The Department may recommend that gradit be allowed for sources taken at 	Academic Calendar and Must De
other institutions. In special cases, 2	approved for graduate credit and

Current MASc in Electrical and Computer	Proposed MASc in Electrical and Computer
Engineering Graduate Studies Academic Calendar	Engineering - Aeronautics Graduate Studies
content:	Academic Calendar content:
courses (0.50 unit weight) may be	Associate Chair for Graduate Studies at
approved.	the time of registration.
	 This degree is offered through the
Master's Seminar	Collaborative Aeronautics Program.
 Students are required to present a 	This program, jointly offered by a range
seminar on their thesis topic as part of	of departments/schools across several
the degree requirements. The purpose	academic faculties, promotes the
of this seminar is to develop the	development of interdisciplinary
student's ability to communicate the	perspectives on aeronautics.
results of a research work in an	Collaborative Aeronautics Program
organized and informative manner. The	students complete their specialist
seminar is not an oral examination of	training in their respective home
the thesis. The seminar should be held	departments/schools, while working
during the term the thesis is submitted	with colleagues from a variety of other
to the readers. The supervisor(s), plus	departments/schools in core
one other Faculty member must be in	interdisciplinary courses (AVIA 601 and
attendance at the seminar in order for	AVIA 602).
the student to receive credit.	 To obtain credit, an individual course
	must be passed with at least a 65%
Master's Thesis	average.
• The topic of the thesis and the choice	 Students may be required at any time
of the required 5 courses of graduate	to withdraw from the program at any
coursework are arranged by students	time if they fail to maintain a minimum
and their faculty supervisor. Each	arade of 65% in each of the 5 courses
student's program is subject to approval	and a cumulative average of at least
by the Graduate Studies Committee of	70% in their coursework portion of their
the Department Students must	approved study program or if they fail to
maintain continuous active registration	receive satisfactory program or <u>in they run to</u>
until the thesis requirements are	regarding their research activities
completed The research work leading	• The Department may recommend that
to the thesis must be performed under	credit be allowed for courses taken at
the direction of the faculty supervisor(s)	other institutions. In special cases, a
and is finally approved and accented by	maximum of 2 courses (0.50 unit
at least three readers. The readers will	weight) may be approved
consist of the supervisor(s) plus a	weight/ may be approved.
minimum of two other faculty members	Master's Seminar
minimum of the ether facally membere.	 Students are required to present a
	seminar on their thesis topic as part of
	the degree requirements. The purpose
	of this seminar is to develop the
	student's ability to communicate the
	results of a research work in an
	organized and informative manner. The
	seminar is not an oral examination of
	the thesis. The seminar should be held
	during the term the thesis is submitted
	to the readers. The supervisor(s) plus
	one other Faculty member must be in
	attendance at the seminar in order for
	the student to receive credit

• Master's Thesis

• The topic of the thesis and the choice of the required 5 courses of graduate

Current MASc in Electrical and Computer	Proposed MASc in Electrical and Computer
Engineering Graduate Studies Academic Calendar	Engineering - Aeronautics Graduate Studies
content:	Academic Calendar content:
	coursework are is arranged by students and their faculty supervisor. Each student's program is subject to approval by the Graduate Studies Committee of the Department. Students must maintain continuous active registration until the thesis requirements are completed. The research work leading to the thesis must be performed under the direction of the faculty supervisor(s) and is finally approved and accepted by at least three readers. The readers will consist of the supervisor(s) plus a minimum of two other faculty members.

Current students will be able to submit a program change to the Collaborative Aeronautics Program.

Department/School approval date (mm/dd/yy): 02/16/2023 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 05/08/23 Faculty approval date (mm/dd/yy): Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy): Senate approval date (mm/dd/yy) (if applicable):



Graduate Studies Program Revision Template

Prior to form submission, review the <u>content revision instructions</u> and information regarding <u>major/minor</u> <u>modifications</u>. For questions about the form submission, contact <u>Trevor Clews</u>, Graduate Studies and Postdoctoral Affairs.

Faculty: Engineering

Programs: 1) Master of Engineering (MEng) in Electrical and Computer Engineering

2) Master of Engineering (MEng) in Electrical and Computer Engineering – Co-operative Program **Program contact name(s)**: Jared Rank **Form completed by**: Jared Rank

Description of proposed changes:

Note: changes to courses and milestones also require the completion/submission of the SGRC Course/Milestone-New/Revision/Inactivation form (<u>PC docx version</u> or <u>MAC docx version</u>).

Adding BE 660 Negotiations to the list of electives for the Graduate Specialization in Business Leadership.

Is this a major modification to the program? No

Rationale for change(s):

The Graduate Specialization in Business Leadership has been designed to introduce students to the processes and best practices for leading technical teams, processes, and organizations in a North American business context. The key purpose of leadership is creating a framework for action. Doing this well requires an understanding of people, familiarity with the "language" of business which is finance, and disciplinary expertise. The Graduate Specialization supplements the expertise students develop in the ECE MEng program with the core skills needed to lead a business venture.

Adding BE660 as an elective will allow our graduate students an opportunity to strengthen their negotiation skills which may lead to favorable outcomes for our students in many real world situations.

Proposed effective date: Term: Fall Year: 2023

Current <u>Graduate Studies Academic Calendar (GSAC)</u> page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-electrical-and-computerengineering/master-engineering-meng-electrical-and-computer-engineering

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-electrical-and-computerengineering/master-engineering-meng-electrical-and-computer-engineering-co-operative-program-direct-entry

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:		
Degree requirements	Degree requirements		
Courses	Courses		

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:		
Current Graduate Studies Academic Calendar content: Students must successfully complete 8 one-term courses (0.50 unit weight) acceptable for credit by the Department. Students may register for any ECE course at the 600 or 700 levels. A minimum of 5 courses must be taken from within the ECE Department. A maximum of 3 courses may be taken from outside the Department but must be from the faculties of Engineering, Mathematics and Science. Students opting for the Graduate Specialization in Business Leadership are allowed to take a maximum of 4 courses from outside ECE, but from the specified list of BE/BET courses, detailed below. A minimum grade of 65% in each of the 8 courses and a minimum cumulative average of 70% are required to remain in the program. Students who receive a grade of less than 65% may be permitted to take a maximum of 2 additional courses to meet the minimum averages for the degree requirements (outlined above). Students wishing to complete a Graduate Specialization as part of their MEng program should consult the list of required courses for each Graduate Detrict back for each graduate Detrict as for each of the for the for the for the for the for the formation of 2 additional courses for each Graduate	 Proposed Graduate Studies Academic Calendar content: Students must successfully complete 8 one-term courses (0.50 unit weight) acceptable for credit by the Department. Students may register for any ECE course at the 600 or 700 levels. A minimum of 5 courses must be taken from within the ECE Department. A maximum of 3 courses may be taken from outside the Department but must be from the faculties of Engineering, Mathematics and Science. Students opting for the Graduate Specialization in Business Leadership are allowed to take a maximum of 4 courses from outside ECE, but from the specified list of BE/BET courses, detailed below. A minimum grade of 65% in each of the 8 courses and a minimum cumulative average of 70% are required to remain in the program. Students who receive a grade of less than 65% may be permitted to take a maximum of 2 additional courses to meet the minimum averages for the degree requirements (outlined above). Students wishing to complete a Graduate Specialization as part of their MEng program should consult the list of required courses for each Graduate 		
 as the number of minimum required courses may differ. Students in the MEng in Electrical and Computer Engineering program may choose to pursue one of the following Graduate Specializations: 	 as the number of minimum required courses may differ. Students in the MEng in Electrical and Computer Engineering program may choose to pursue one of the following Graduate Specializations: 		
 Artificial Intelligence and Machine Learning Biomedical Engineering Business Leadership Computer Networking and Security Nanoelectronic Circuits and Systems Nanoelectronic Devices and Materials Software Sustainable Energy 	 Artificial Intelligence and Machine Learning Biomedical Engineering Business Leadership Computer Networking and Security Nanoelectronic Circuits and Systems Nanoelectronic Devices and Materials Software Sustainable Energy 		
 A Graduate Specialization is a University credential that is recognized on the student's transcript but not on the diploma and is intended to reflect that a student has successfully completed a set of courses that 	 A Graduate Specialization is a University credential that is recognized on the student's transcript but not on the diploma and is intended to reflect that a student has successfully completed a set of courses that 		

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:		
 content: together provide an in-depth study in	 content: together provide an in-depth study in		
the area of the Graduate Specialization.	the area of the Graduate Specialization.		
A student will only obtain the Graduate	A student will only obtain the Graduate		
Specialization on their transcript if they	Specialization on their transcript if they		
have completed the requirements	have completed the requirements		
associated with the MEng degree and	associated with the MEng degree and		
the requirements associated with the	the requirements associated with the		
Graduate Specialization. All MEng Graduate Specializations in	Graduate Specialization. All MEng Graduate Specializations in		
Electrical and Computer Engineering	Electrical and Computer Engineering		
consist of a set of at least 4 graduate	consist of a set of at least 4 graduate		
(0.50 weight) level courses and this set	(0.50 weight) level courses and this set		
is comprised of a mix of compulsory	is comprised of a mix of compulsory		
and elective courses. Compulsory	and elective courses. Compulsory		
courses are those that are prescribed	courses are those that are prescribed		
as part of the Graduate Specialization.	as part of the Graduate Specialization.		
Elective courses are those that are on a	Elective courses are those that are on a		
list of courses designated as electives	list of courses designated as electives		
for a given Graduate Specialization.	for a given Graduate Specialization.		
The requirements for each of the	The requirements for each of the		
Graduate Specializations are described	Graduate Specializations are described		
below. Note: Not all elective courses for any	below. Note: Not all elective courses for any		
given Graduate Specialization are	given Graduate Specialization are		
guaranteed to be offered each year.	guaranteed to be offered each year.		
Students are encouraged to take	Students are encouraged to take		
elective courses when they are offered	elective courses when they are offered		
and should plan accordingly. Students will be able to complete the	and should plan accordingly. Students will be able to complete the		
Business Leadership Graduate	Business Leadership Graduate		
Specialization and the MEng	Specialization and the MEng		
degree. The number of required courses	degree. The number of required courses		
for the MEng degree will	for the MEng degree will		
increase from 8 to 9 or 10	increase from 8 to 9 or 10		
depending on the requirements	depending on the requirements		
associated with the Graduate	associated with the Graduate		
Specializations. Students must consult with the ECE	Specializations. Students must consult with the ECE		
Masters Coordinator to finalize their	Masters Coordinator to finalize their		
plan of study and to ensure that they	plan of study and to ensure that they		
are able to meet the degree and	are able to meet the degree and		
Graduate Specialization requirements	Graduate Specialization requirements		
within the procram time limits	within the procram time limite		
3. Graduate Specialization in Business	3. Graduate Specialization in Business		
Leadership	Leadership		
 To receive the Graduate Specialization	 To receive the Graduate Specialization		
in Business Leadership, students must	in Business Leadership, students must		

Current Graduate Studies Academic Calendar	Proposed Graduate Studies Academic Calendar		
content:	content:		
successfully complete 2 compulsory courses and 2 elective courses: Compulsory courses: BE 600 Management and Leadership BE 601 Introduction to Financial and Managerial Accounting Elective courses (choose 2 from the following list): Note: not all elective courses may be offered each year. BE 602 Data Analysis and Management BE 603 Operations and Supply Chain Management BE 604 Marketing Management BE 605 Project Management BE 606 Entrepreneurship and Innovation BE 610 Special Topics in Business and Entrepreneurship BE 680 Consulting ECE 657A Data & Knowledge Modelling & Analysis ECE 699 Master of Engineering Project Note: A maximum of 4 courses from outside the Department of ECE is permitted to satisfy both the MEng in ECE and Graduate Specialization in Business Leadership requirements.	successfully complete 2 compulsory courses and 2 elective courses: Compulsory courses: BE 600 Management and Leadership BE 601 Introduction to Financial and Managerial Accounting Elective courses (choose 2 from the following list): Note: not all elective courses may be offered each year. BE 602 Data Analysis and Management BE 603 Operations and Supply Chain Management BE 603 Operations and Supply Chain Management BE 605 Project Management BE 606 Entrepreneurship and Innovation BE 610 Special Topics in Business and Entrepreneurship BE 660 Negotiations BE 680 Consulting ECE 657A Data & Knowledge Modelling & Analysis ECE 699 Master of Engineering Project Note: A maximum of 4 courses from outside the Department of ECE is permitted to satisfy both the MEng in ECE and Graduate Specialization in Business Leadership requirements.		

Students currently enrolled in the MEng programs will be able to enroll in BE 660 as an elective.

Departmental approval date (mm/dd/yy): 03/16/2023 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy):05/04/23 Faculty approval date (mm/dd/yy): Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy): Senate approval date (mm/dd/yy) (if applicable):



Prior to form submission, review the <u>content revision instructions</u>. For questions about the form submission, contact <u>Trevor Clews</u>, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Effective date: Term: Winter Year: 2024

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

□ New: Choose an item.

□ Inactivate: Choose an item.

Revise: from Choose an item. to Choose an item.

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

□ New: Complete all course elements below

- ☑ Inactivate: Complete the following course elements: CHE, 610, 000333, Theory and Application of Transport Phenomena
- □ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: CHE

Course number: 610

Course ID: 000333

Course title (max. 100 characters including spaces): Theory and Application of Transport Phenomena

Course short title (max. 30 characters including spaces):

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: Mathematical analysis of momentum, heat and mass transport in systems of chemical engineering interest: development of the differential equations of change (continuity, motion and energy) for forced convection in isothermal, non-isothermal and multi-component systems; description of velocity, temperature and concentration profiles and computation of momentum, energy and mass fluxes at surfaces under

conditions of laminar flow; description of transport in turbulent flow by time-smoothing of the equations of change; turbulent velocity, temperature and concentration profiles.

Meet type(s): Lecture	Choose an item.	Choose an item.	Choose an item.
Primary meet type: Leo	cture		

Delivery mode: On-campus

Requisites:

Special topics course: Yes \Box No \boxtimes

Cross-listed course: Yes \Box No \boxtimes

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

- CHE 610 has been re-numbered as CHE 601, and CHE 601 is the new code being used.
- CHE 610 was retained in the Calendar pending degree completion by students who took it towards degree requirements.

Form completed by: Department/School approval date (mm/dd/yy): 03/24/23 Reviewed by GSPA (for GSPA use only) ⊠ date (mm/dd/yy): 04/17/23 Faculty approval date (mm/dd/yy): Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):



For Recommendation	Public	Open Session
То:	Graduate & Research Council	
Sponsor: Contact Information:	Jeff Casello, Associate Vice-President Gradua Postdoctoral Affairs jcasello@uwaterloo.ca	te Studies and
Presenter: Contact Info:	Marianne Simm, Director Graduate Studies an msimm@uwaterloo.ca	d Postdoctoral Affairs
Date of Meeting:	June 12, 2023	

Item Identification:

Class Delivery Modes

Summary:

This document (appendix A) provides proposed definitions for class delivery modes that were developed by the Registrar's Office through the members of Keep Learning Team and led by the Associate Registrar to improve clarity for instructors and students when scheduling and selecting courses each term. The intent is to include and adopt these definitions in the Graduate Studies Academic Calendar 'Glossary of terms'. The increased interest in and adoption of blended learning courses has amplified the importance of this project at this time.

Recommendation/Motion:

Adoption of the submitted definitions for the graduate calendar (Glossary of terms), in alignment with the same additions to the undergraduate calendar.

The University should adopt the delivery mode definitions for In-Person, Blended, and Online in this document.

Jurisdictional Information:

Undergraduate Council and Graduate and Research Council plan to submit these definitions jointly to Senate for approval.

Governance Path:

Review by Graduate Operations Committee, approval by Graduate and Research Council, approval by Senate.

Previous Action Taken:

1. October 18, 2022; review by Graduate Operations Council



- 2. February 13, 2023; review and sent back for further consultation by Graduate and Research Council
- 3. March 21, 2023; review by Graduate Operations Committee and edits shared with the Keep Learning Team via the Associate Registrar.

Highlights:

Addition of definitions for delivery modes of instruction to the Graduate Studies Academic Calendar Glossary of Terms, and the Quest Glossary of Terms, as presented in detail (Appendix A), to include;

IN-PERSON: a class with scheduled instruction or activity occurring in person.

BLENDED: a class in which instruction or activity is distributed between scheduled in-person and required online activities, resulting in fewer scheduled in-class hours.

ONLINE: a class scheduled to be fully online that requires no in-person instruction or activity (may require in-person exam(s)); may be exclusively asynchronous (no scheduled meets), synchronous (scheduled meets), or a combination of the two.

Next Steps:

To be included in the Fall 2023 Graduate Academic Calendar.

Documentation Provided:

Appendix A



APPENDIX A SENATE GRADUATE AND RESEARCH COUNCIL June 2023

Class Delivery Modes

Definitions for Modes

Current definition in the glossary of terms in the <u>GSAC.</u>	Proposed definition (to be added to the glossary of terms in the <u>GSAC</u> and <u>Quest</u> site)
N/A	In-person: a class with scheduled instruction
N/A	Blended: a class in which instruction or activity is distributed between scheduled in- person and required online activities, resulting in fewer scheduled in-class hours.
N/A	Online : a class scheduled to be fully online that requires no in-person instruction or activity (may require in-person exam(s)); may be exclusively asynchronous (no scheduled meets), synchronous (scheduled meets), or a combination of the two.

Additional background information on definitions

NOTE (not for inclusion in the calendar): Hyflex classes have recently been delivered in a held-with format, where 2 delivery modes are held simultaneously. Hyflex is an emerging combined mode that will need definition and system development in order to evolve further. Hyflex = a class that is scheduled both in-person and is simultaneously delivered remotely. Students have the choice to attend in-person or remotely on a class-by-class basis. Future considerations of hyflex should also address the possibility of an asynchronous option for those engaging in the course online.

CLASS	DEFINITION	NOTES/EXAMPLES	SCHEDULING TERMS ASSOCIATED WITH EACH		
DELIVERY			DELIVERY MODE		
MODES					
MODEO			Тне	THE "LOCATION"	EXAMPLES
			"CAMPUS"	OF WHERE A	
			CODES	COURSE IS	
			INDICATE	TAUGHT IS ALSO	
			WHICH	IDENTIFIED	
			INSTITUTION		



			OFFERS THE COURSE		
IN- PERSON	A class with scheduled instruction or activity occurring in person	Scheduled meet only on campus/in- person	UW: University of Waterloo (Main) CGC: Conrad Grebel University College REN: Renison University College STJ: St. Jerome's University UTD: United College WLU: Wilfrid Laurier University	U: Main campus G: Conrad Grebel University College J: St. Jerome's University UTD: United College R: Renison University College L: Wilfrid Laurier University STRATFORD: Stratford campus KITCHENER: Kitchener campus CAMBRIDGE: Cambridge campus	UW U = Taught by the University of Waterloo at the University of Waterloo's Main Campus UW STRATFORD = Taught by the University of Waterloo at the University of Waterloo's Stratford Campus
BLENDED	A class in which instruction or activity is distributed between scheduled in- person and required online activities, resulting in fewer scheduled in- class hours.	Scheduled on- campus meet + asynchronous online meet/activity (e.g., flipped classroom) Scheduled on- campus meet + synchronous online meet/activity	BLND: Blended course (Main) BLNDG: Blended course (Conrad Grebel University College) BLNDJ: Blended	U: Main campus G: Conrad Grebel University College J: St. Jerome's University UTD: United College	BLND U = Taught by the University of Waterloo; on- campus meet is at the University of Waterloo's Main Campus and includes online element



	Both types of meets must appear in the schedule of classes, including the online piece whether asynchronous or synchronous To reduce class time, seek approval from department chair	course (St. Jerome's University) BLNDT: Blended course (United College) BLNDR: Blended course (Renison University College)	R: Renison University College L: Wilfrid Laurier University STRATFORD: Stratford campus + ONLINE: Online course	BLND UTD = Taught by the University of Waterloo; the on-campus meet is at United College and includes online element
ONLINE A class scheduled to be fully online that requires no in- person instruction or activity (may require in-persor exam(s)); may be exclusively asynchronous, or a combination of the two.	Fully online CEL course Instructor- developed online course Fully synchronous course with regularly scheduled meets via web conferencing Asynchronous course with some scheduled meets (seminars, tutorials, office hours) Synchronous course with online asynchronous	ONLN: Online course (Main) ONLNG: Online course (Conrad Grebel University College) ONLNJ: Online course (St. Jerome's University) ONLNT: Online course (United College) ONLNR: Online course	ONLINE: Online course	ONLN ONLINE = Taught by the University of Waterloo and occurs online ONLNR ONLINE = Taught by Renison University College and occurs online



	discussion or other	(Renison	
	activities	University	
		College)	
May 30, 2023

- TO: Tim Weber-Kraljevski, Governance Officer, Senate Graduate and Research Council
- FROM: Jeff Casello, Associate Vice-President, Graduate Studies and Postdoctoral Affairs (GSPA) Liz Nilsen, Assistant Vice-President, GSPA Marianne Simm, Director, GSPA

RE: Graduate Studies Academic Calendar (GSAC) changes

Items for approval:

Updating and expanding the co-operative education section to include Graduate Work-integrated Learning definitions and content. Adding a new Community and Industry Research Projects (CIR) course component to the GSAC and Quest glossary of terms.

Description and rationale for proposed changes:

The University's <u>strategic commitment</u> towards developing talent for a complex future includes expanding Work Integrated Learning (WIL) opportunities at the graduate level. This is a signature objective towards the goal of enhancing graduate studies. Within this "GradWIL" initiative, an identified challenge is in tracking where and how graduate WIL activities takes place. That is, currently, there is inconsistency in terminology as well as how similar activities are recorded across graduate programs. The purpose of this Calendar language is to provide structure and consistency for how programs label/record their WIL offerings such that this information can be tracked institutionally (or by individual programs). The proposed Calendar language also identifies other forms of WIL beyond the current description, which only identifies co-operative education. Consultations, which included this proposed structure, have been ongoing (involving Faculty graduate groups, graduate students, CEE leaders, GSPA, RO, individual graduate programs, etc.).

Proposed effective date: Term: Fall Year: 2023

Current <u>Graduate Studies Academic Calendar (GSAC)</u> page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/general-information-and-regulations/cooperative-education

https://uwaterloo.ca/graduate-studies-academic-calendar/general-information-andregulations/glossary-terms

Current Graduate Studies Academic	Proposed Graduate Studies Academic
Calendar content:	Calendar content:
Co-operative education	Graduate Work-integrated Learning
Some departments within the University make	Work-integrated learning (WIL) opportunities
provision for co-operative work terms at the	are provided to students across numerous
Master's or the PhD level. Normally, two terms	graduate programs at the University of
of co-op work terms are required for this option.	Waterloo. Adopting the Co-operative and Work-
Students admitted to co-operative degree	Integrated Learning Canada (CEWIL) definition.

Current Graduate Studies Academic	Proposed Graduate Studies Academic
Calendar content:	Calendar content:
programs register part-time for their work terms. Check with your department/school to see whether the co-op option is available.	<u>WIL "is a form of curricular experiential</u> <u>education that formally integrates a student's</u> <u>academic studies with quality experiences</u> <u>within a workplace or practice setting. WIL</u> <u>experiences include an engaged partnership of</u> <u>at least: an academic institution, a host</u> <u>organization, and a student. WIL can occur at</u> <u>the course or program level and includes the</u> <u>development of student learning objectives and</u> <u>outcomes related to: employability, agency,</u> <u>knowledge and skill mobility and life-long</u> <u>learning."</u>
	WIL allows for theoretical learning to be integrated with practice, promoting deeper understanding of theory through practical application. Graduate programs offering WIL opportunities should follow best-practices through the inclusion of the following key WIL components: pedagogy (curricular elements that include when the activity occurs, duration/intensity, and training); experience (ensuring meaningful activities and alignment with the WIL definition); assessment (of activities based on identified learning outcomes); and reflection (on what constitutes purposeful work for each student). Regardless of how WIL is structured, activities should align with Graduate WIL (GradWIL) learning development process. (See below for GradWIL learning development process text, included for reference).
	At the University of Waterloo, there are different WIL models that provide consistency in how WIL experiences are offered and recorded across academic programs. While there may be some WIL activities that do not fall within one of the models (as well as accreditation requirements for professional programs), academic units should use one of the following WIL models to facilitate standardization and institutional tracking of experiences. 1. <u>Course-level WIL</u> is delivered in the context of a course (either required or elective) and activities are typically facilitated through a course instructor. Students receive course credit for the activity, with the unit weight being determined by the intensity/duration of

Current Graduate Studies Academic Calendar content	Proposed Graduate Studies Academic Calendar content
	activities. Course-level WIL comes in the form of the following models: a) Community and Industry Research Projects (CIR) or b) Practicums: ¹
	a) <u>Community and Industry</u> <u>Research Projects (CIR):</u> <u>Supporting the course objectives,</u> <u>CIR consist of a project or</u> <u>assignment within the course</u> <u>wherein students engage with a</u> <u>partner organization either</u> <u>individually or in teams. The course</u> <u>project/assignment would occur in or</u> <u>with external organizations, with</u> <u>examples being consulting projects,</u> <u>design projects, program</u> <u>evaluations. When a course involves</u> <u>CIR, the activity would be identified</u> <u>with a secondary (or tertiary)</u> <u>component using the course</u> <u>component CIR.</u>
	b) Practicums (PRA): Practicums are a work-integrated learning experience that form the basis of the course and provide students with intensive, hands-on experience in a setting relevant to their subject of study (paid or unpaid). Practicums are typically supervised within the external setting by identified person(s) who are approved by the program (based on their professional and other competencies). Practicum hour requirements are established by the program, vary across different programs and courses. Practicums are denoted as a primary component using the course component PRA. Practicums are usually graded as credit/no-credit.
	2. <u>Program-level WIL is delivered as a</u> required component of the program with associated WIL activities typically facilitated through the academic unit, often in partnership with Co-operative and Experiential Education (CEE).

Current Graduate Studies Academic	Proposed Graduate Studies Academic
Calendar content:	Calendar content:
	Program-level WIL comes in the form of
	the following models: a) Co-operative
	Education or b) Internship. Program-
	level WIL would be identified through the
	program name, plan code, and
	corresponding milestone(s). In both
	models, the WIL activity provides
	experience in a practice/workplace
	setting related to the student's field of
	study. Typically the WIL activity would
	occur at a time in the student's
	academic program to allow for an
	integration of learning between the WIL
	experience and academic/research
	activities. As program-level WIL typically
	involves full-time activity, students would
	be required to have a change of
	enrollment status during their
	experience(s).
	a) Co-operative Education (Co-op):
	Co-op is full-time, paid work
	experience in a workplace setting
	that is related to the student's area
	of study and career interest. Co-op
	programs typically include
	completion of a professional
	development course prior to a work
	term (COOP 601 ²), work term(s),
	and reflective and/or work reports as
	required by the graduate program. In
	masters-level programs with co-op
	designations, students are required
	to successfully complete a minimum
	of one standard work-term and, if
	specified by their program, one
	additional work term (standard or
	flexible work-terms). Co-op doctoral
	programs require a minimum of
	three standard work-terms and, if
	specified by their program, additional
	work terms (standard or flexible
	work-terms).
	<u></u>
	b) Internships: Internships are
	supervised work-integrated learning
	experiences that are discipline-
	specific and directly align with the
	graduate program's learning

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Current Graduate Studies Academic	Proposed Graduate Studies Academic
Calendar content:	Calendar content:
	outcomes. Internships require
	approval by the graduate program.
	Internships vary in length and
	Intensity, but are typically between 4
	months to 12 months of full-time
	uppaid) and supervised within the
	external setting by identified persons
	who are approved by the graduate
	program (based on their professional
	and other competencies).
	<u> </u>
	Separate from course or program-level
	offerings, many graduate students are involved
	in discipline-specific research activities that
	constitute WIL either as part of degree
	requirements (e.g., thesis or Master's Research
	Paper) or as additional research projects during
	their graduate training (i.e., during a time when
	they have active enrollment status). Such
	community partner and an identified faculty
	collaborator (in most cases, the research
	supervisor) For research activities to be
	considered WIL, there must be co-creation of
	the research objectives by the external partner
	and the student/faculty member, active
	engagement and interaction between the
	student and external partner, and the external
	partner should have a role in providing
	feedback to and/or assessment of the student
	<u>activity.</u>
	¹ There are other types of experiential learning seurope
	that take place in a setting outside the classroom [e.g.,
	Labs (LAB), Field Studies (FLD), Studio (STU)]. The key
	distinction between these types of courses and those that
	partnership with an external/host organization is not
	required. If criteria for WIL is met, courses should be
	identified as CIR or PRA.
	² COOP 601 does not count towards home program
	degree course requirements.

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
Glossary of terms	Glossary of terms
N/A	Community and Industry Research Projects
	(CIR): This is a secondary or tertiary component

Current Graduate Studies Academic	Proposed Graduate Studies Academic
	that involves student engagement in research that occurs primarily in or with external
	organizations (including consulting projects, design projects, program evaluations). This component is only used at the graduate-level.

GradOps review date: 04/18/23 GradWIL Steering Committee review date: 05/08/23

Additional information

NOTE: The content below will *not* be added to the GSAC but will be included on a separate GradWIL resource page. It is included here because it is referenced within the proposed calendar text.

GradWIL Learning Development Process

GradWIL Learning Development Process has been designed to help guide how WIL is offered at the University of Waterloo, such that learning outcomes (i.e., based on program-specific <u>graduate</u> <u>degree level expectations</u> and/or <u>future ready talent framework</u>) can be supported. This learning development process is provided to help shape decision-making, and, as a collective, create the conditions for purposeful work.

Prior to their experience students will have had the opportunity to:

- Evaluate the level of their current knowledge, skills, and abilities
- **Reflect** on their values, needs and the strengths/gaps in their current knowledge, skills, and abilities
- **Plan** how to utilize strengths and improve upon gaps in knowledge, skills, and abilities while on an experience

While on experience students will have had the opportunity to:

- **Develop** and/or **implement** research, evidence-informed solutions and/or other work reflecting their depth and breadth of discipline and context specific knowledge
- Collaborate and build professional relationships with industry and/or community partners
- **Reflect** on their current work experience, demonstrating evolution in their knowledge, skills, and abilities, a deeper understanding of their values and needs, and an appreciation for differences in workplace cultures

Following their experience students will have had the opportunity to:

- **Illustrate** how their values, knowledge, skills and abilities are connected to their career identity (i.e. overall career goals, interests, and motivations)
- **Reflect** on how their career identity can contribute to academia, government, and/or private and public sectors to impact people, teams, organizations, and communities
- Integrate their career identity, experiences, and competencies into a post-graduation action plan