

**Senate
Notice of Meeting**

Date: Monday 21 November 2022

Time: 3:30 pm

Place: NH 3407 ¹

	OPEN Session		Page #
3:30	To begin the meeting, the President will call Senate's attention to the wampum belts that have been framed and hung for display in the room, and will invite Elder William Woodworth to speak		
3:45	1. Conflict of Interest	Declaration	
	2. Approval of the Agenda	Decision	
	3. Minutes of the 17 October 2022 Meeting	Decision	5
	4. Business Arising from the Minutes		
	5. Senate Workplan	Information	9
3:55	6. Report of the President a. President's Update	Oral/Information	
	7. Leadership Updates		
4:00	a. Report of the Vice-President, Research & International i. Operational and Strategic Matters	Oral/Information	
	ii. Commercialization and Entrepreneurship		
4:15	b. Report of the Vice-President, Academic & Provost i. Briefing Note – Graduate and Undergraduate Admissions Data	Oral/Information	11
	ii. Briefing Note – HREI Review Report		17
4:30	8. Reports from Committees and Councils a. Senate Graduate & Research Council i. <i>To approve a new research-based Doctor of Philosophy in Entrepreneurship and Organization, offered by the Conrad School of Entrepreneurship and Business in the Faculty of Engineering, effective 1 September 2023, as presented</i>	Decision	25
	ii. <i>To approve the removal of the part-time option from the following programs: both the Master and Doctor of Philosophy in Pure Mathematics and both the Master and Doctor of Philosophy in Pure Mathematics-Quantum Information</i>	Decision	25
	iii. <i>To approve identifying the process for students to enter the thesis study option for the Master of Mathematics in Pure Mathematics and the Master of</i>	Decision	25

¹ Telephone coordinates will be provided to Senators unable to attend in person
SENATE

	<i>Mathematics in Pure Mathematics-Quantum Information</i>		
	iv. <i>To approve removing the personal statement from the list of minimum admission requirements for the Doctor of Philosophy in Pure Mathematics and the Doctor of Philosophy in Pure Mathematics-Quantum Information.</i>	Decision	25
	v. <i>To approve adding a transfer entry internship option to the Doctor of Philosophy in Combinatorics and Optimization and the Doctor of Philosophy in Combinatorics and Optimization-Quantum Information programs, in addition to keeping the regular existing PhD programs. Note: Other than the internship requirement and the fact that these are not direct-entry programs, these two PhD programs are identical to the regular existing PhD programs. The program name that appears on diplomas and transcripts will be identical for both options.</i>	Decision	26
	vi. <i>To approve adding a Master's Research Paper study option to the Master of Mathematics in Data Science program.</i>	Decision	26
	b. Senate Undergraduate Council		
	i. <i>That Senate approve the following proposed Biomaterials and Tissues Specialization, Medical Artificial Intelligence Specialization, and Medical Devices Specialization, effective 1 September 2023</i>	Decision	107
	ii. <i>That Senate approve the following proposed Building Science Specialization, effective 1 September 2023</i>	Decision	110
	iii. <i>That Senate approve the following changes to the Bachelor of Sustainability and Financial Management, effective 1 September 2023</i>	Decision	111
	c. Joint Report - Senate Graduate & Research Council and Senate Undergraduate Council		
	i. <i>To approve the 2023-2024 academic calendar dates and calendar guidelines for establishing academic dates, as presented</i>	Decision	115
	ii. <i>To approve the Principles and Guidelines for Digital Learning, effective 1 January 2023, as presented</i>	Decision	115
	d. University Committee on Student Appeals	Information	125
	9. Other Business		
5:00	CONSENT Agenda Motion: To approve or receive for information the items on the consent agenda, listed as items 10-11 of the Senate agenda		
	10. Reports from Committees and Councils		
	a. Senate Graduate & Research Council	Information	127

	b. Senate Undergraduate Council		
	i. That Senate approve the following proposed revisions to the Academic Decisions for the Faculty of Engineering, effective 1 September 2023	Decision	129
	ii. That Senate approve the following proposed revisions to the Academic Promotion Rules for the Faculty of Engineering, effective 1 September 2023	Decision	131
	iii. That Senate approve the following proposed revisions to the Undergraduate Communication Requirement for the Faculty of Environment, effective 1 September 2023	Decision	138
	c. Senate Long Range Planning Committee	Information	161
	11. Report of the Vice-President, Research & International	Information	163
	a. Research outputs and outcomes: Awards, Distinctions, Successful Grants, Waterloo International Engagements		
	12. Reports from the Faculties		169
5:15	CONFIDENTIAL Session		
	13. Minutes of the 17 October 2022 Meeting	Decision	171
	14. Business Arising from the Minutes		
	15. Report of the President	Oral/Information	
	16. Reports from Committees and Councils		
	a. Honorary Degrees Committee	Decision	173
	17. Other Business		

14 November 2022

Mike Grivicic
Associate University Secretary
Secretary to Senate

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University of Waterloo
SENATE
Minutes of the Monday 17 October 2022 Meeting

Present: Sheila Ager, Marc Aucoin, Sandra Banks, Michael Beauchemin, Jason Blokhuis, Jeff Casello, Trevor Charles, Joan Coutu, Neil Craik, Kristine Dalton, David DeVidi, Laura Deakin, Charmaine Dean, Jack DeGooyer, Nenone Donaldson, Catherine Dong, Aiman Fatima, Wendy Fletcher, Bruce Frayne, George Freeman, Mark Giesbrecht, Moira Glerum, Vivek Goel (chair), Rob Gorbet, Kelly Grindrod, Mike Grivicic (secretary), David Ha, Mary Hardy (for Lori Curtis), Dennis Huber, Sonia Ismail, Narveen Jandu, Achim Kempf, Jennifer Kieffer, Veronica Kitchen, Scott Kline, Christiane Lemieux, Robert Lemieux, Lili Liu, Brad Lushman, Ellen MacEachen, Carol Ann MacGregor, Blake Madill, Peter Meehan, Nasser Mohieddin Abukhdeir, Graham Murphy, Cathy Newell Kelly, Erin O’Connell, Daniel O’Connor, Troy Osborne, Nicholas Pfeifle, Luke Potwarka, Mary Robinson, James Rush, Matthew Schwarze, Marcus Shantz, Siva Sivoththaman, Chao Tan, Sharon Tucker, Graeme Turner, Diana Vangelisti, Paul Ward, Dan Weber, Mary Wells, Stan Woo, Changbao Wu, Annie Yang, En-Hui Yang, Stephanie Ye-Mowe

Guests: Tanya Andrews, Jean Becker, Bruce Campbell, Jana Carson, Aldo Caputo, Bernard Duncker, Annamaria Feltracco, Diana Goncalves, Michele Hollis, Karen Jack, Andrea Kelman, Nick Manning, Anton Mosunov, Fayaz Noormohamed, Chris Read, Ian Rowlands, Daniela Seskar-Hencic, Allan Starr, Brandon Sweet, Mat Thijssen, Kerry Tolson, Johanna Wandel, Katy Wong Franco

Absent: John Abraham*, Dominic Barton*, Lisa Bauer-Leahy, Kim Cuddington, Lori Curtis, Cindy Forbes*, Onurcan Gokkaya, Kevin Hare, Natalie Hutchings, Martin Karsten*, Alysia Kolentsis, Xianguo Li, Ceileigh McAllister*, Richard Myers*, Beth Namachchivaya*, Oudy Noweir, Naima Samuel*, Siv Sivaloganathan, Julian Surdi*, Clarence Woudsma,
*regrets

OPEN SESSION

CHAIR’S REMARKS

The chair welcomed members to the meeting and applauded the deans for their efforts to showcase the annual United Way workplace campaign.

He remarked: welcome to Mary Hardy, who is serving in place of Lori Curtis who is unavailable; municipal elections are upcoming on 24 October, and we encourage all members to participate in this important democratic exercise; excellent feedback received on the joint Board-Senate session on 28 September, and areas will be identified for further engagement as well as for increased involvement of Senate; recent President’s Forum was held on 3 October with attendees both in person and participating online, which provided an excellent venue for discussions re: Waterloo at 100; the fall convocation ceremonies are upcoming on 21-22 October, and members are encouraged to participate as they are able; Mary Robinson was confirmed earlier today as the Faculty senator representative to the Board of Governors, term to 30 April 2023.

1. CONFLICT OF INTEREST

Senators were asked to declare any conflicts they may have in relation to the items on the agenda. No conflicts were declared.

2. APPROVAL OF THE AGENDA

By consensus, members approved the agenda as presented.

3. MINUTES OF THE 19 SEPTEMBER 2022 MEETING

A motion was heard to approve the minutes as distributed. Giesbrecht and Wells. Carried.

4. BUSINESS ARISING FROM THE MINUTES

The chair observed that item 8(c) arises from the minutes of the previous meeting. No other items arising were noted.

5. SENATE WORKPLAN

The chair noted that minor changes have been made to the timing of some items, toward fine tuning the work plan. This item was received for information.

6. REPORT OF THE PRESIDENT

a. President's Update. The president highlighted important recent events: commitment ceremony held last month where he acknowledged the University's full commitment to reconciliation, Indigenization and decolonization of the institution; at the same ceremony the president received gifts of an eagle feather and two wampum belts, some of which will be displayed in the Board and Senate chamber; a Walk for Truth and Reconciliation was held on 30 September, coinciding with the National Day for Truth and Reconciliation and honoring the lost children and Survivors of residential schools, their families and communities; the president expressed his sorrow at the murder of student Mahsa Amini at the hands of Tehran's Guidance Patrol; the president expressed his sadness at the death of Sarah Inam, a Waterloo alum who lost her life to intimate partner violence, and underscored the importance of taking an active role to speak out against gender-based violence; the University will participate in the 16 days of Activism against Gender-based Violence, led by UN Women; the University hosted the Sustainable Aeronautics Summit earlier this month, with keynote from Commander Chris Hadfield; the recent Black and Gold Day and Ontario Universities' Fair were very successful events; overview of recent announcements re: university rankings, and noting that the Waterloo at 100 discussions have taken an interest in areas where the institution ought to be concerned with elements of these exercises, or not.

b. Strategic Plan Annual Update 2021-22. Goel provided a PowerPoint presentation: areas of ongoing strength for Waterloo, along with prospective areas for improvement; trends in enrollment growth and graduation rates, with relevant comparators; employment trends for faculty and staff, highlighting increased turnover during the pandemic; another employee survey will be required in the near term to provide insight into the condition of the current workforce; perceptions of student experience from both undergraduate and graduate surveys; co-op employment has rebounded and is at pre-pandemic levels; strong showing vs. comparators for employment of Waterloo graduates in co-op; trends in reduced government funding in recent years; startup culture and innovation ecosystem, with strong research funding in key areas (and accounting for the presence of medical schools at comparator institutions); tracking alumni engagement; greenhouse gas emission trends and efforts made by the institution to continually improve in its environmental footprint. Members discussed: the greenhouse gas emissions reported are scope 1 and 2, and work is being done toward accounting for scope 3 emissions; would be good to obtain more content on faculty-specific matters and to engage with faculty on strategic plan goals, as faculty have potentially become more disengaged in recent years due to the pandemic. Some members requested access to the source material and data and will liaise with staff in IAP to that end.

7. LEADERSHIP UPDATES

a. Report of the Vice-President, Academic & Provost

The provost provided an operational update via PowerPoint presentation: observations and trends in facets of student experience including athletics, campus housing, and the utilization of counselling and health services; upcoming conference on student mental health this month; supporting new student transitions; recent actions taken to promote health and safety on campus, with ongoing attention to making operational decisions based on evidence and science; recent release of guidelines for flexible work and for electronic monitoring (the latter as required by Bill 88). Members discussed the messaging to campus pertaining to masking and some members indicated that more unreserved support for masking would be appropriate.

i. Policy 76/77 Update. Rush and Hardy jointly gave a PowerPoint presentation in support of the memo included with the agenda, highlighting the shared interest and desire between all parties involved to bring the process to a close in a way that is timely and best for the University community. Members discussed the memo and proposal: the policy process is fairly antiquated

and not necessarily in keeping with the needs of today's University community; the heterogeneity of teaching loads across units makes it difficult to find a single policy solution; perceptions of a breakdown in the policy process do not necessarily reflect the complexity of the issues at hand and the efforts made by all parties to thoroughly examine those issues; there is provision for communication to the community as part of the proposed process, which fosters transparency.

A motion was made:

To approve the following membership on the Policy 76/Policy 77 Drafting Committee: Mary Hardy (statistics and actuarial science, FAUW appointee); Su-Yin Tan (geography and environmental management, FAUW appointee); Paul Wehr (psychology, FAUW appointee); David DeVidi (associate vice-president, academic, President's appointee); Anna Esselment (political science, President's appointee); and Ian VanderBurgh (mathematics, President's appointee).

Rush and Hardy.

A motion was made to amend the main motion to add two student observers into the process, one each from the GSA and WUSA. Pfeifle and Ye-Mowe.

Members discussed: this amendment would place the membership outside the established policy framework; the proposal as presented is the outcome of extensive discussions between the interested parties; while students are indirectly impacted by the outcome of the process, it would set an impractical precedent to account for indirect impacts in setting the membership of policy development committees. One senator called a point of order and observed that the amending motion is out of order, as the motion would result in a clear departure from the established policy framework. The chair ruled the amending motion to be out of order. The chair affirmed that Policy 1 has no provision for observer in policy development committee, observing that both the provost and FAUW president have committed to bringing in student perspective as appropriate.

The main motion was carried, with one opposed and one abstaining.

b. Report of the Vice-President, Research & International

This item was deferred to the next meeting.

8. REPORT FROM COMMITTEES AND COUNCILS

a. Senate Graduate & Research Council

Dean introduced the item and Olaf Weber provided an overview of the prospective new center, affirming that all Faculties have been contacted with regard to joining in on this new activity. A motion was heard to approve the establishment of the Centre for Sustainability and Business (CSB), as presented. Dean and Ager. Carried with one opposed and one abstention.

b. Senate Undergraduate Council

DeVidi spoke to the item and a motion was heard to approve the proposed correction of the official name of the Environmental Sciences plans, both Honours and Honours Co-operative, to be pluralized (Environmental Sciences versus Environmental Science), effective 1 September 2023. DeVidi and Lemieux. Carried with one abstention.

c. Senate Executive Committee

Goel provided an overview of the report, and a motion was heard to approve the appointment of Dr. Scott Kline as the Council of Ontario Universities (COU) Academic Colleague for the University of Waterloo, term to 30 April 2025. Casello and O'Connor. Carried with one abstention.

d. Senate Long Range Planning Committee

Goel noted the committee's discussion of Waterloo at 100 as well as the Digital Learning Strategy. This item was received for information.

9. OTHER BUSINESS

There was no other business.

CONSENT AGENDA

A motion was heard to approve or receive for information the items on the consent agenda, listed as items 10-12 of the Senate agenda. Freeman and Ye-Mowe. Carried.

10. REPORTS FROM COMMITTEES AND COUNCILS

- a. **Senate Graduate & Research Council.** Received for information.
- b. **Senate Undergraduate Council.** Two items approved; remaining items received for information.

11. REPORTS OF THE VICE-PRESIDENT, ACADEMIC & PROVOST

To approve the lists of candidates for degrees, diplomas, and certificates as specified in the document which is uploaded to Senate's SharePoint site.

12. REPORTS FROM THE FACULTIES. Received for information.

With no further business in open session, Senate convened in confidential session.

25 October 2022
/dg

Mike Grivicic
Associate University Secretary
Secretary to Senate

2022-2023 Senate Work Plan

Senate Agenda Items • expected *as needed	15 May 2023	19 June 2023 <i>Strategic Plan - Research</i>	19 September 2022	17 October 2022 <i>Strategic Plan Annual Update / Waterloo.at-100</i>	21 November 2022	19 December 2022	16 January 2022 <i>Strategic Plan - Talent</i>	27 February 2023 <i>TBD</i>	27 March 2023 <i>Strategic Plan - Communities - Sustainability</i>	17 April 2023 <i>TBD</i>
REGULAR AGENDA (including items for information and discussion)										
Minutes	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
Business Arising	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
LEADERSHIP UPDATES⁶										
Report of the Vice-President Academic and Provost	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
Report of the Vice-President Research & International	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
REPORTS FROM COMMITTEES AND COUNCILS										
Executive Committee	*	*	*	*	*	*	*	*	*	*
Graduate & Research Council (GRC)	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
Undergraduate Council (UC)	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
Long Range Planning Committee				▪	▪			▪		▪
Joint Report of GRC & UC on Academic Calendar Dates					▪					
University Committee on Student Appeals Annual Report					▪					
University Appointment Review Committee Annual Report										▪
Finance Committee - Budget Update ³								▪		
Finance Committee - Budget recommendation ^{2, 3}									▪	
OTHER SENATE AGENDA ITEMS										
New Senator Orientations (before meeting)	▪									
Teaching Awards Committee									▪	
Roster of Graduands	▪			▪						
Undergraduate and Graduate Admissions Update										▪
SENATE PRESENTATIONS										
Presentations from the Presidents of the Faculty Association, Waterloo Undergraduate Association and Graduate Student Association										▪
Strategic Plan Accountability Update				▪						
PART Annual Update		•								

¹ Annual item

² Board of Governors approval

³ Presented by the Vice-President Academic and Provost

⁴ Presented by the President and Vice-Chancellor, and Chair of Senate

⁵ Presented by the University Secretary

⁶ Leadership updates may include such topics as: Talent, We Accelerate Report, Communities (EDI, Sustainability), Waterloo International, etc.

Senate Agenda Items • expected *as needed	16 May 2022	20 June 2022	19 September 2022	17 October 2022 <i>Strategic Plan Annual Update / Waterloo at 100</i>	21 November 2022 <i>Degree Level Expectation</i>	19 December 2022	16 January 2022 <i>Talent</i>	27 February 2023 <i>TBD</i>	27 March 2023 <i>Strategic Plan – Communities – Sustainability</i>	17 April 2023 <i>TBD</i>
CONSENT AGENDA										
Reports from Faculties (e.g., appointments, administrative appointments, sabbaticals) ²	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
Tenure and Promotion Report ⁴			▪							
University Professor Designation ³									▪	
Call for Nominations for University Professor ³			▪							
Call for Nominations for Honorary Degree Recipients and Convocation Speakers ⁴								▪		
Report of the COU Academic Colleague					▪					
Senate Committee Appointments ⁵	*	*	▪	*	*	*	*	*	*	*
CONFIDENTIAL AGENDA										
Minutes	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
Business Arising	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
Reports from Committees and Councils	*	*	*	*	*	*	*	*	*	*
Honorary Degree Recommendations	*	*	*	*	▪	*	*	▪	*	*
Reports from Search and Review Committees for Policy-based Senior Leadership Appointments and Reappointments	*	*	*	*	*	*	*	*	*	*
Report of VP Advancement on Policy 7 (June)		•								

Joint SENATE/BOARD Strategic Plan Focus Sessions 3-4:30	Joint SENATE/BOARD Continuing Education Sessions 3-4:30
<ul style="list-style-type: none"> January 10 2023 - Talent March 21 2023 Communities (Sustainability) May 2 2023 Research 	<ul style="list-style-type: none"> February 1 2023 – Quality Assurance Framework (Undergrad/Grad Programs) March 1 2023 – Funding Environment, SMA, Corridors

Special Topics for 2022-2023 to be Scheduled:

- President’s Anti-racism Task Force Update (PART)
- Waterloo at 100
- Senate Governance Review Recommendations and Updates

For more information:

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 NH 3060

¹ Annual item

² Board of Governors approval

³ Presented by the Vice-President Academic and Provost

⁴ Presented by the President and Vice-Chancellor, and Chair of Senate

⁵ Presented by the University Secretary

⁶ Leadership updates may include such topics as: Talent, We Accelerate Report, Communities (EDI, Sustainability), Waterloo International, etc.

For Information

Public

Open Session

To:

Senate

Sponsor:Cathy Newell Kelly, University Registrar and
Jeff Casello, Associate Vice President Graduate Studies and
Postdoctoral Affairs**Contact Information:**cnkelly@uwaterloo.ca; jcasello@uwaterloo.ca**Presenter:**

James Rush, VP Academic and Provost

Contact Info:provost@uwaterloo.ca**Date of Meeting:**

November 21, 2022

Item Identification:

Graduate and undergraduate admissions data.

Summary:

This Brief provides undergraduate and graduate admissions data and supporting context. The undergraduate data includes the 2018 – 2022 admissions funnel and the graduate data includes the 2019-2022 admissions funnel.

Recommendation/Motion:

This report is intended to support Senate’s awareness of the admissions funnel to provide background information relevant to the Provost’s report. Members are encouraged to review the two related briefing notes (also enclosed). At the meeting of Senate, opportunity will be given to ask any additional questions.

Jurisdictional Information:

Drawing directly from the terms of reference, the item’s relationship to the body’s specific responsibility is In accordance with [Senate Bylaw 2](#) (section 3.04b), this report is being forwarded to the Senate for information.

Governance Path:

This data will be subsequently provided to the Board of Governors for information.

Previous Action Taken:

This data is monitored annually and has been provided to the Faculties.

Highlights:

This update is intended to provide members of Senate information regarding application trends that impact our ability to meet our enrollment targets—differentiated between domestic and international applicants. These data help members of Senate understand trends in our applications, our offers of admissions and new admits. There are interpretations of the data included with the submission.

Documentation Provided:

The following briefing notes have been provided

1. Undergraduate Admissions 2018 – 2022
2. Graduate Admissions 2019 – 2022

BRIEFING

DATE: November 14, 2022
SUBJECT: Undergraduate Admissions 2018 – 2022

BACKGROUND

This Brief provides data regarding the 2018 – 2022 admissions funnel for undergraduate students: number of applications, number of offers, number of confirmations (acceptance), and count date registrations (Nov 1 enrolment, first year new admits) for each of the most recent five years. Data are divided into domestic and international numbers, as each cohort represents different targets and is assessed at different levels of tuition. The data presented are the composite across the University, which represents a range of programs from those that are highly competitive to those that admit at their stated minimum entry averages, and for which alternate offers to programs also apply (See Appendix A for data on undergraduate admissions).

CORE CONTEXT

Domestic

- Domestic applications and enrollment have remained strong overall, despite the pandemic, with confirmations exceeding expectations.
- Key recruitment events for the class of 2022 were conducted virtually in Fall 2021 (e.g., the Ontario Universities Fair and Fall Open House), with some hybrid events conducted in early 2022 (e.g., March Break Open House and You @ Waterloo Day).
- Despite the strong overall percentage of domestic students enrolled, it is important to understand the heterogeneity across different programs as this requires ongoing attention to recruitment to increase applicant numbers in programs that are admitting at minimum averages and through deflections.

International

- There is global competition for international students. Waterloo's programs are heterogeneous in terms of their competitiveness, and therefore also in the size and strength of the applicant pool for admissions and cutoffs.
- The pandemic continued to impact the 2021-2022 recruitment cycle, especially internationally. During the pandemic, international students and their families faced additional barriers to pursuing post-secondary studies abroad. These included financial hardship, challenges learning at home in the online environment, mental health challenges, study permit delays, and many others.
- Record attrition levels were seen between confirming in June and beginning classes in September. This trend was seen across most universities.
- Recent improvements in travel and mobility will enhance in-person recruitment strategies, coupled with focus on addressing program areas where expansion of the international applicant pool is desirable and enhancing supports of various kinds, including financial and non-financial processes.

APPENDIX A: UNDERGRADUATE ADMISSIONS

Table 1: Domestic Admissions, 2018-2022

DOMESTIC	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022
Applications	38,308	36,645	37,027	42,244	50,000
Offers	22,686	22,638	27,218	26,140	26,750
Confirmations	6,242	5,952	6,888	6,680	6,556
Registrations - Year 1 New	5,723	5,652	6,335	6,123	6,058
Admits Targets	5,495	5,553	5,558	5,532	5,594
% of Target	104%	102%	114%	111%	108%

Table 2: International Admissions, 2018-2022

INTERNATIONAL	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022
Applications	20,809	20,202	18,661	19,247	17,777
Offers	6,128	6,634	8,877	7,540	8,421
Confirmations	1,613	1,463	2,215	1,452	1,545
Registrations – Year 1 New	1,180	1,084	1,469	965	937
Admits Targets	1,113	1,260	1,271	1,223	1,187
% of Target	106%	86%	116%	79%	79%

BRIEFING

DATE: November 14, 2022

SUBJECT: Graduate Admissions 2019 –2022

BACKGROUND

This Brief provides data regarding graduate admissions and enrollments for Fall 2022, and the preceding three years (see Appendix A for data on graduate admissions).

Graduate admissions take place over all three terms: approximately 80% of new admissions occur in fall, 10% in winter and 10% in spring. Graduate admissions are differentiated by students' country of citizenship – domestic (including PR) and international – as well as program of study – PhD and Masters. (Among Master's students, more disaggregate data (professional v. research programs) are available, but are not included in Appendix A.)

There can be substantive variations year-over-year in applications, offers made, and offers accepted. As such, we compare fall 2022 data to the average of the previous three years (2019-2021). For graduate admissions, we monitor the number of offers accepted, as this is a critical variable for predicting our intake. This rate is included for comparison.

Research graduate students complete their programs at various points throughout the year. As such, total enrollment is influenced not only by intake, but also by the number of graduations which can differ year-over-year.

CORE CONTEXT

- **Masters Programs:**
 - Fall 2022 saw decreases in the number of domestic applications, offers, and offers accepted. As a result, domestic intake is expected to decrease by 15.5%.
 - Fall 2022 saw increases in the number of international applications, offers and offers accepted. As a result, international intake is expected to increase by 9%.
 - Total Masters enrolment for fall 2022 is expected to be 3.4% lower than the three- year average, predominantly as a result of the net 7.5% total decrease in Fall 2022 intake across international and domestic Masters students.

- **PhD Programs:**
 - Fall 2022 saw decreases in the number of applications, number of offers, and absolute number of offers accepted for both domestic and international pools. As a result, the PhD intake for fall 2022 will decrease by 25% across pools.
 - While our intake has decreased, the total PhD enrollment for fall 2022 exceeds the previous three-year averages modestly, with a total increase of 2.4% across categories. This is likely a result of extended times to completion for our current PhD candidates, both domestic and international. Their continued presence in PhD programs likely explains the lower number of offers made as part of the fall 2022 admissions process.
 - Anecdotally, students' times to completion can be explained to some extent by the pandemic.
 - Separately, the decline in applications and offers accepted for PhD programs will require continue monitoring.

APPENDIX A: GRADUATE ADMISSIONS 2019—2022

Table 1: Masters Admissions, 2019-2022

Masters Data	Fall 2019	Fall 2020	Fall 2021	Avg F19-21	Fall 2022	% Change
Domestic Masters Applications	3433	3455	3994	3627	3456	-4.7%
Domestic Masters Offers Made	1929	1959	1865	1918	1639	-14.5%
Domestic Masters Offers Accepted	1278	1355	1191	1275	1029	-19.3%
Domestic Masters Offer Acceptance Rate	66%	69%	64%	66%	63%	
Domestic Masters Intake	1144	1200	1047	1130	955	-15.5%
Total Domestic Masters Enrolment	2725	2808	2770	2767	2516	-9.1%
International Masters Applications	6929	6494	8279	7234	7410	2.4%
International Masters Offers Made	1356	1203	1761	1440	1537	6.7%
International Masters Offers Accepted	692	593	834	706	774	9.6%
International Masters Offer Acceptance Rate	51%	49%	47%	49%	50%	
International Masters Intake	574	429	630	544	593	9.0%
Total Int'l Masters Enrolment	1274	1173	1356	1224	1341	9.6%
Total Masters Intake	1718	1629	1677	1674	1548	-7.5%
Total Masters Enrollment	3999	3981	4126	3991	3857	-3.4%

Table 2: PhD Admissions, 2019-2022

PhD Data	Fall 2019	Fall 2020	Fall 2021	Avg F19-21	Fall 2022	% Change
Domestic PhD Applications	422	449	501	457	427	-6.6%
Domestic PhD Offers	248	260	264	257	208	-19.1%
Domestic PhD Offers Accepted	188	207	195	197	148	-24.9%
Domestic PhD Offer Acceptance Rate	76%	80%	74%	77%	71%	
Domestic PhD Intake	171	199	179	183	141	-23.0%
Total Domestic PhD Enrolment	1243	1318	1317	1293	1340	3.6%
International PhD Applications	1314	1316	1204	1278	1051	-17.8%
International PhD Offers	240	229	252	240	192	-20.0%
International PhD Offers Accepted	152	159	153	155	113	-27.1%
International PhD Offer Acceptance Rate	63%	69%	61%	65%	59%	
International PhD Intake	131	141	133	135	96	-28.9%
Total Int'l PhD Enrolment	948	942	980	957	964	0.7%
Total PhD Intake	302	340	312	318	237	-25.5%
Total PhD Enrolment	2191	2260	2297	2250	2304	2.4%

For Information

Public

Open Session

To:

Senate

Sponsor:

James W.E. Rush, Vice-President Academic and Provost

Contact Information:

Provost's Office

Presenter:

James W.E. Rush, Vice-President Academic and Provost

Contact Info:

Provost's Office

Date of Meeting:

November 21, 2022

Item Identification:

Update on the response to the organizational review of the Human Rights, Equity and Inclusion (HREI) Unit.

Summary:

This report provides a consolidated report back to Senate summarizing activity aligned to the recommendations emerging from the organizational review of the Human Rights, Equity, and Inclusion Unit conducted by external reviewers delivered July 2021.

Recommendation/Motion:

This report is intended to support Senate's awareness of the progress towards addressing the 16 recommendations in the HREI Review Report. Members are encouraged to review the briefing note (also enclosed). At the meeting of Senate, opportunity will also be given to hear about work accomplished since the implementation of the Indigenous Relations and EDI-R Offices and to ask any additional questions.

Jurisdictional Information:

In accordance with [Senate Bylaw 2](#) (section 3.04b), this report is being forwarded to the Senate for information.

Governance Path:

On October 18, 2021, James W.E. Rush, Vice-President Academic and Provost provided an update to Senate on the HREI review report, which resulted in the leadership announcements of Jean Becket as the Associate Vice-President, Office of Indigenous Relations, and Dr. Christopher Taylor as Associate Vice-President, Office of Equity, Diversity, Inclusion and Anti-Racism. To date, other key governance and leadership bodies who have discussed progress towards implementation of the report's recommendations include Deans Council (DC) with members of the President's senior executive team (PVP).

Previous Action Taken:

All previous actions relate to holding generative discussions on actions for strengthening Waterloo's approach to supports for Indigenous reconciliation, anti-racism, equity, diversity, and inclusion at Waterloo.

Highlights:

The enclosed report summarizes the recommendations included in the HREI Review Report submitted to the University in July 2021. The Report sets out 16 recommendations for strengthening Waterloo's supports for Indigenous reconciliation, anti-racism, equity, diversity, and inclusion at Waterloo. The release of the report was followed by immediate and ongoing action, including significant investment and a realignment of structure, resources and mandates to ensure that the work of Indigenous reconciliation, anti-racism, equity, diversity, and inclusion at Waterloo clearly serves the needs of students, faculty, staff and community. Appendix A provides a full list of the recommendations in the HREI Review Report. The right hand column in Appendix A provides some examples of progress that have fulfilled the University's directives towards those recommendations, noting that many of the recommendations are to process and work that the University remains committed to on an ongoing basis.

Next Steps:

Additional action is underway to finalize the structure and resources for offices formerly under HREI, including amending the reporting structure of the Conflict Management and Human Rights Office and exploring appropriate space for offices.

Documentation Provided:

- Briefing note: Update on response to organizational review of the Human Rights, Equity and Inclusion Unit

BRIEFING

DATE: November 14, 2022
SUBJECT: Update on response to organizational review of the Human Rights, Equity and Inclusion Unit

BACKGROUND

In August 2020, the University engaged a team of external experts to conduct a [formal review of the Human Rights, Equity and Inclusion Unit](#) at Waterloo to advise on strengths, challenges, and opportunities the University should consider to ensure the needs of the Waterloo community are met in an efficient, effective, and progressive manner.

The review team conducted comprehensive consultations with members of racialized and Indigenous groups, students, faculty, staff, Executive Council members, external and community partners, and relevant University Committees. Implementation of the thoughtful recommendations that emerged from the report have helped to strengthen Waterloo's approach to supports for Indigenous reconciliation, anti-racism, equity, diversity, and inclusion at Waterloo.

The release of the report was followed by immediate and ongoing action, including significant investment and a realignment of structure, resources and mandates to ensure that the work of Indigenous reconciliation, anti-racism, equity, diversity, and inclusion at Waterloo clearly serves the needs of students, faculty, staff and community.

The following provides a consolidated report back to Senate summarizing activity aligned to the recommendations emerging from the formal review.

CORE CONTEXT

- The HREI Review Report was submitted to the University in July 2021.
- The Report sets out 16 recommendations for strengthening Waterloo's supports for Indigenous reconciliation, anti-racism, equity, diversity, and inclusion at Waterloo.
- Appendix A provides a full list of the recommendations in the HREI Review Report. The right hand column in Appendix A provides some examples of progress that have fulfilled the University's directives towards those recommendations, noting that many of the recommendations are to process and work that the University remains committed to on an ongoing basis.

NEXT STEPS

Additional action is underway to finalize the structure and resources for offices formerly under HREI, including amending the reporting structure of the Conflict Management and Human Rights Office (CMHRO) (Recommendation 9) and exploring appropriate space for the EDI-R Office, CMRHO and Sexual Violence Prevention and Response Office (SVPRO) (recommendation 16).

The changes implemented to date are not the end of our journey at Waterloo to create change. Waterloo is committed to ongoing action to make the University a people-centered institution committed to genuine care, concern, respect, inclusivity, and well-being for all.

APPENDIX A: ACTIONS ALIGNED TO HREI REVIEW REPORT RECOMMENDATIONS

#	RECOMMENDATION	EXAMPLE ACTIONS
1	<p>The Senior Leadership should articulate clearly its bold and ambitious vision for equity and inclusion, together with goals and actions, and how progress will be measured. This needs to have strong linkages to Waterloo’s broader success as an academic institution and may be grounded in comparable values and actions which supported the University’s reputation for innovation.</p>	<ul style="list-style-type: none"> • Under the Futures Framework, the Societal Futures acknowledges colonial legacies, structural racism and social injustices abound • Waterloo has established five cross-institutional priorities for 2022/23, including two focused on the promotion of indigenization of campus and EDI-R • The EDI-R office released a framework for the EDI-RO Strategic Plan 2022-25
2	<p>The Senior Leadership should commit to a series of measures to increase transparency and community belief that they are fully committed to a progressive approach to equity and inclusion at the University.</p>	<ul style="list-style-type: none"> • On September 22, Vivek Goel, President and Vice-Chancellor made a full commitment to reconciliation, Indigenous and decolonization at a public Commitment Ceremony • Significant investment and a realignment of structures has been completed in response to the HREI review. The Indigenous Relations and EDI-R Offices have developed strategic plans and initiatives to expand work across these portfolios • Regular updates on measurable progress for Strategic Plan 2020-25 themes, including sustainable and diverse communities • Waterloo has made a Public commitment to addressing 88 PART Report recommendations (April 2022) • Waterloo signed the Scarborough Charter on Anti-Black Racism (November 2021)
3	<p>Review and re-establish the mandate or purpose of HREI to ensure clarity for the University, HREI staff and the Waterloo community. Rename HREI to appropriately reflect the new purpose and mandate.</p>	<ul style="list-style-type: none"> • HREI was dissolved as the Indigenous Relations and EDI-R Offices were created with new mandates to replace two of the functions of HREI
4	<p>Provide explicitly that HREI serves students, faculty and staff. and services available through the EDI-R and Indigenous</p>	<ul style="list-style-type: none"> • Mandates of Indigenous Relations and EDI-R Offices specifically support students, faculty and staff

	Relations Office reflect mandates in support of students, faculty and staff.	<ul style="list-style-type: none"> Programs, supports and services available through the Indigenous Relations and EDI-R Office reflect mandates in support of students, faculty and staff
5	Consider two, if not three, Associate Vice-President roles: AVP Indigenous Initiatives, and AVP Anti-Racism, Equity and Inclusion, or consider disaggregating the second role into AVP Anti-Racism, and AVP Equity and Inclusion. Recommend considering Vice-President roles in a 3-5 year time frame.	<ul style="list-style-type: none"> Two new Associate Vice-Presidents reporting to the Provost have been appointed for three year terms (Jean Becker, AVP Indigenous Relations and Dr. Christopher Taylor, AVP EDI-R) AVP EDI-R has developed an Anti-Racism Office with dedicated staff resources under the leadership of Jennisha Wilson, Director, Anti-Racism
6	Ensure Associate Vice-Presidents are members of decision-making tables such as Deans' Council, Executive Council and the Executive team.	<ul style="list-style-type: none"> The AVP Indigenous Relations and AVP EDI-R are members of Executive Council, Info Group, Council of Academic Leaders, and are invited to Senate Long Range Planning, Deans' Council and PVP to provide regular updates
7	Establish Indigenous Initiatives as a separate Department from HREI. At the same time, consider whether "Initiatives" conveys the sustainability needed for long-term indigenous engagement.	<ul style="list-style-type: none"> The Indigenous Relations Office has been established as a separate department from the HREI Unit (see recommendation 3 above) Indigenous Relations has replaced the previous terminology of Indigenous Initiatives
8	Preserve the Waterloo Indigenous Student Centre (WISC) as part of St. Paul's University College. Waterloo should continue to support and enhance WISC.	<ul style="list-style-type: none"> Shatitsirótha' – the WISC was preserved as part of United College (formerly St. Paul's University College) and continues to provide supports to Indigenous students The University has provided annual funding to WISC to support a portion of operating costs, in addition to the annual Postsecondary Education Fund for Aboriginal Learners (PEFAL) grant from the Ministry. The Indigenous Relations Office works collaboratively with WISC on key initiatives
9	Establish a University Department with the work streams of Equity, SVPRO and Anti-Racism. CMHRO in its current form should not be part of the Department. The current models for	<ul style="list-style-type: none"> Models for Education, awareness, administration and communications and engagement have been maintained in the EDI-R Office

	Education and Awareness, Administration and Communications and Engagement within this Department should not change.	<ul style="list-style-type: none"> • Work is underway to establish a revised organizational structure and reporting relationships for CMHRO following the dissolution of HREI • Also see recommendation 10 below regarding SVPRO
10	Consider amending the reporting relationship of SVPRO to be more formally connected with the Associate Provost, Students portfolio, in addition to its reporting relationship within HREI.	<ul style="list-style-type: none"> • SVPRO now reports directly to the Associate Provost, Students as HREI has been dissolved
11	Develop a strong front door for HREI that includes a robust intake and triage function, as well as advice and facilitation of informal resolution of Human Rights Code-based issues/conflicts, as appropriate.	<ul style="list-style-type: none"> • The Indigenous Relations and EDI-R Offices have developed a shared intake form to support an effective triage function to direct the users needs to the appropriate persons
12	Build upon existing professional staff strength, including a focus on hiring more racialized staff.	<ul style="list-style-type: none"> • The EDI-R Office has expanded significantly with key positions, the majority of which have been filled by racialized staff <ul style="list-style-type: none"> ○ New staff roles: EA to AVP EDI-R; Administrative Manager; Director, Antiracism; Associate Director, Equity; Equity Specialist (second position in this role); Senior Equity Training Specialist; Senior Director, Institutional & Strategic Priorities; and Manager, Equity Office • The Indigenous Relations Office has expanded with positions restricted to Indigenous candidates <ul style="list-style-type: none"> ○ New staff roles: Associate Director, Indigenous relations; Indigenous Special Projects Coordinator • Many positions in support of anti-racism and Indigenous Relations have been developed in Units across campus, including CEE, Library, and Counselling Services, among others • In 2021 Waterloo launched the Black Excellence and Indigenous Excellence cluster hiring initiatives, committing to a minimum of 12 positions for each cluster

13	Build greater connections with faculty, through appointments or secondments of academic experts.	<ul style="list-style-type: none"> • The Provost collaborated with Special Advisors to the Indigenous Excellence and Black Excellence faculty cluster hiring initiative who offered training, guidance and participation on selection committees. • The Indigenous Relations Office works collaboratively with Faculty in the Indigenous Advisory Circle, Elder in Residence William Woodworth, Faculty of Engineering, and Indigenous Knowledge Keeper Myeengun Henry, Faculty of Health • The AVP EDI-R is facilitating strengthened connections with faculty on an ongoing basis through the Program Area Leads (PALs) program, which uses a hub and spoke model to lead and facilitate culture change by embedding Equity, Diversity, Inclusion, and Anti-racism (EDI-R) into their curriculum, programs, and units. • The EDI-RO is establishing the Sankofa Network for Transformative & Community Research (SNTCR), which is devoted to engaging academics, undergraduate and graduate students, community members, and national and international collaborators, to produce action-oriented research. • The EDI-R Office partnered with faculty experts for the delivery of synchronous training sessions on equitable recruitment and selection training for faculty.
14	Move to expeditiously develop expertise in HREI to drive a data collection program that enables the University to accelerate evidence-based decision making about its strategies, goals and progress	<ul style="list-style-type: none"> • In collaboration with IAP as the information steward, the Secretariat, and with the Equity Data Advisory Working Group, the EDI-R office led the development of Waterloo's Equity Survey. The survey launched in June 2021 as one way to help identify equity gaps in programs, services, and policies to better meet the needs of underrepresented and equity-deserving students and employees.
15	Consistent with bold action and innovation, the University should commit \$1million in recurring (base) funding each year over a 5-year period, for a total of \$5-million in recurring funding at the end of the 5 years. This funding should be protected from budget reductions and should be reviewed after 5 years. The AVPs should be required to report to the Waterloo	<ul style="list-style-type: none"> • Significant funding provided through expanded staff complements for the newly created Indigenous Relations and EDI-R Offices, including two new AVP roles. • Additional investments/funding commitments made in approved project-based funding (e.g., tuition program to support Indigenous students; Transitional Year Program for Black Youth).

	<p>community annually about both the allocation of funds and progress towards priorities and goals.</p>	<ul style="list-style-type: none"> • Additional funding provided across campus (e.g., CEE, Library, Faculties). • Dedicated central funding over three years for the Indigenous Excellence and Black Excellence faculty cluster hiring initiatives.
<p>16</p>	<p>HREI should have space appropriate for its mandate in a location separate from campus police, recognizing the need for traditionally marginalized communities to feel safe talking about their experiences.</p>	<ul style="list-style-type: none"> • Renovations are nearing completion on a new space for the Indigenous Relations Office. • The Indigenous Relations Office has collaborated to develop or support a number of Indigenous Spaces on Campus (e.g., WISC; Ceremonial Fire Grounds and Medicine Garden; Indigenous Knowledge Keeper's Space; and Indigenous Gathering Space).

University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
Report to Senate
21 November 2022

Senate Graduate & Research Council met on 3 October 2022 and agreed, in accordance with [Senate Bylaw 2](#) (section 4.03), to forward the following item to Senate for approval as part of the regular agenda.

Further details are available at: <https://uwaterloo.ca/secretariat/committees-and-councils/senate-graduate-research-council>

FOR APPROVAL ([Senate Bylaw 2](#); section 4.03(e))

NEW PROGRAM – FACULTY OF ENGINEERING

Graduate Program Proposal of Doctor of Philosophy in Entrepreneurship and Organization

1. **Motion:** To approve a new research-based Doctor of Philosophy in Entrepreneurship and Organization, offered by the Conrad School of Entrepreneurship and Business in the Faculty of Engineering, effective 1 September 2023, as presented.

PROGRAM CHANGES - FACULTY OF MATHEMATICS

Pure Math, as presented.

2. **Motion:** To approve the removal of the part-time option from the following programs: both the Master and Doctor of Philosophy in Pure Mathematics and both the Master and Doctor of Philosophy in Pure Mathematics-Quantum Information.
Rationale: The programs are structured for full-time study. Pure Math has not been admitting students to part-time, so listing it as an option is inaccurate. The possibility for full-time students to change to part-time as part of an accommodation could still be evaluated/approved on a case-by-case basis.
3. **Motion:** To approve identifying the process for students to enter the thesis study option for the Master of Mathematics in Pure Mathematics and the Master of Mathematics in Pure Mathematics-Quantum Information.
Rationale: For most students, the Research Paper option is the best fit. Accordingly, Pure Math is currently only admitting students to the Research Paper option, allowing a transfer to the Thesis Option only after a strong first term and a willing Supervisor. The thesis study option is intended for students who have already taken many graduate courses as an undergraduate and are ready for a larger research component. Pure Math now would like the process stated in the calendar.
4. **Motion:** To approve removing the personal statement from the list of minimum admission requirements for the Doctor of Philosophy in Pure Mathematics and the Doctor of Philosophy in Pure Mathematics-Quantum Information.
Rationale: Pure Math no longer requires a personal statement for admission. They are instead asking for a research proposal or summary of recently completed project which is part of the supplemental admission information form.

Combinatorics and Optimization, as presented.

5. **Motion:** To approve adding a transfer entry internship option to the Doctor of Philosophy in Combinatorics and Optimization and the Doctor of Philosophy in Combinatorics and Optimization-Quantum Information programs, in addition to keeping the regular existing PhD programs. Note: Other than the internship requirement and the fact that these are not direct-entry programs, these two PhD programs are identical to the regular existing PhD programs. The program name that appears on diplomas and transcripts will be identical for both options.

Rationale: By enrolling in either of these two new PhD program options with a required internship, international students will be able to obtain a work permit to do an internship and work full-time hours at the internship in any term, subject to the conditions stated in the motion.

Data Science, as presented.

6. **Motion:** To approve adding a Master's Research Paper study option to the Master of Mathematics in Data Science program.

Rationale: Data Science is adding a Master's Research Paper option to the program to be consistent with other Master of Mathematics programs within the Faculty.

/mh kw Jeff Casello
Associate Vice-President, Graduate Studies and
Postdoctoral Affairs

Charmaine Dean
Vice-President, Research & International

Senate Graduate and Research Council

For Approval

Public

Open Session

To: Senate

Sponsor: Siva Sivoththaman, Associate Dean, Graduate Studies & Postdoctoral Affairs

Contact Information: Faculty of Engineering,
519-888-4567 x43376, sivoththaman@uwaterloo.ca

Presenter: Shavin Malhotra, Professor of Strategy and Conrad Research Excellence Chair, Conrad School of Entrepreneurship and Business

Contact Info: Faculty of Engineering
Phone: 519-888-4567 x40458, shavin.malhotra@uwaterloo.ca

Date of Meeting: November 21, 2022

Item Identification:

NEW PROGRAM:

Graduate Program Proposal of Doctor of Philosophy in Entrepreneurship and Organization.

Summary:

This is a research-based program offering a Doctor of Philosophy (Ph.D.) in Entrepreneurship and Organization by the Conrad School of Entrepreneurship and Business (“the School”) in the Faculty of Engineering. The Ph.D. program will include course work, a comprehensive examination, a thesis proposal, and a thesis. The program will charge tuition consistent with all other Ph.D. programs at the institution and will be delivered as a full-time program on-campus.

Recommendation/Motion:

To approve a new research-based Doctor of Philosophy in Entrepreneurship and Organization, offered by the Conrad School of Entrepreneurship and Business in the Faculty of Engineering, effective 1 September 2023, as presented.

Jurisdictional Information:

This item is being submitted to Senate in accordance with [Senate Bylaw 2](#); section 4.03(e).

Governance Path:

The proposal was approved by the School on 16 November 2021, the Faculty of Engineering on 15 February 2022, and on 3 October 2022, Senate Graduate and Research Council unanimously agreed to forward the proposal to Senate for approval.

Senate Graduate and Research Council

Previous Action Taken:

The proposal was drafted by Dr. Shavin Malhotra (Professor of Strategy) with input from Mark Weber (Director, Conrad School of Entrepreneurship and Business). The proposal was also discussed internally with other Conrad School faculty members and staff and their input was included in drafting the proposal.

Highlights:

The objective of the Ph.D. program is to train students to conduct independent scientific research in the domains of Entrepreneurship and Organizations. Many business schools have departments and programs in “Management and Organizations”. This program’s focus on Entrepreneurship and Organizations captures both what makes it the same and different, from related programs elsewhere. Like Ph.D.’s in Management and Organizations, this program builds on the fundamental theoretical foundations of the micro-, macro- and meso-organizational behavior and strategy literatures. What makes the program different is that, instead of primarily using a management lens or studying behavior in management contexts, this program applies an entrepreneurial lens and studies behavior in entrepreneurial contexts. Some specific areas of research include:

- New venture creation
- Small business and entrepreneurship
- Entrepreneurial strategy
- Entrepreneurship policy
- Entrepreneurial organizations
- Family-owned organizations
- Organizing entrepreneurial firms
- Entrepreneurial cognition and decision-making
- Corporate and social entrepreneurship
- Innovation and strategic renewal within existing organizations
- Organizational management and leadership

The new Ph.D. program is consistent with the priorities identified in University of Waterloo’s [Strategic Plan 2020-2025](#): “Be a global powerhouse for commercializing research, developing new enterprises and supporting business growth”.

The proposed Ph.D. program in Entrepreneurship and Organization will be the first such program offered in Canada. While there are universities that offer Ph.D. in Management with specialization in Entrepreneurship, to the best of the School’s knowledge, there is no such similar Ph.D. program which is designed entirely around Entrepreneurship. A key strategy for the University of Waterloo is to continuously build on its distinguishing strengths: Experiential education, Entrepreneurship, and Transformative research – with entrepreneurship at the center of its strategic plan.

A Ph.D. program in Entrepreneurship and Organization will not only complement the University’s strategic plan, but also other programs in the Conrad School, such as the Master of Business, Entrepreneurship and Technology (MBET) program. The School’s goal is to move

Senate Graduate and Research Council

toward a place where students view the School as their first choice for both entrepreneurial practice and entrepreneurial research. A Ph.D. program at Conrad School will help achieve both these goals. In addition, the program will increase Conrad's research intensity, assist faculty in advancing their research programs, and position the school as a center for thought leadership in Entrepreneurship and related fields.

Next Steps:

If approved by Senate, this new program proposal will be submitted to the Quality Council for academic approval and the Ministry for tuition and grant approval. A decision from the Quality Council can be expected within 1-2 months after submission. Whereas a decision from the Ministry is expected to take anywhere between 4-6 months.

Documentation Provided:

Appendix A: Academic Calendar Text

Appendix B: Volume I – New Program Proposal

Appendix C: Program and Dean Responses to External Reviewers' Report



Graduate Studies New Program Template

Prior to form submission, review the [new graduate program instructions](#). For questions about the form submission, contact [Trevor Clews](#), Graduate Studies and Postdoctoral Affairs.

Faculty: Engineering

Program: Doctor of Philosophy (PhD) in Entrepreneurship and Organization

Program contact name(s): Shavin Malhotra, Mark Weber

Form completed by:

Note: new courses and milestones also require the completion/submission of the SGRC Course/Milestone-New/Revision/Inactivation form ([PC docx version](#)).

Proposed effective date: Term: Fall Year: 2023

[Graduate Studies Academic Calendar \(GSAC\)](#) section (include the link to the section (web page) where the new program will be located):

<https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/conrad-school-entrepreneurship-and-business>

Proposed Graduate Studies Academic Calendar content:

DOCTOR OF PHILOSOPHY (PHD) IN ENTREPRENEURSHIP AND ORGANIZATION

Program information

- **Admit term(s)**
 - Fall
- **Delivery mode**
 - On-campus
- **Length of program**
 - Students are required to complete the program in accordance with the [University program time limits](#).
- **Program type**
 - Doctoral
 - Research
- **Registration option(s)**
 - Full-time
- **Study option(s)**

Proposed Graduate Studies Academic Calendar content:

- Thesis

Admission requirements

- **Minimum requirements**

- Applicants will ideally hold a graduate degree in Business, Management, Economics, Psychology, Sociology or a related social science discipline, and must have a minimum overall average of 75%, or equivalent, in the previous degree. Those with more technical degrees (e.g., Engineering, Computer Science, Statistics) may also be considered where there is clear evidence of interest in the application of those fields to human behavior and choice in organizational or entrepreneurial settings. Applicants should highlight any prior research or research assistantship experience in their applications. The graduate degree could be a one or two-year program.
- In exceptional cases, where a student has performed extremely well in a 4-year Honours degree in one of the domains listed above, and excelled in a scholarly research project, applicants can gain direct admission to the PhD program with the agreement of the Committee, Associate Director, Research and Doctoral Studies, and the Director of the Conrad School.
- GMAT or GRE results are required for domestic and international applicants to the PhD program. Applicants should have written these tests within the past five years.

- **Application materials**

- Curriculum vitae
- Supplementary information form
- Transcript(s)

- **References**

- Number of references: 3
- Type of references: at least two should be academic references and one can be professional

- **[English language proficiency \(ELP\) \(if applicable\)](#)**

Degree requirements

- **[Graduate Academic Integrity Module \(Graduate AIM\)](#)**

- **Courses**

- Students must complete the following courses by the end of the third term:
 - BET 701 Entrepreneurship Theory
 - BET 702 Organization Behavior
 - BET 703 Business Strategy
 - BET 704 Business Research Methods
- Two graduate level method or data analysis courses from the following options:
 - ECON 622 Applied Microeconometrics I
 - MSCI 609 Quantitative Data Analysis for Management Sciences
 - PSYCH 630 Advanced Analysis of Variance
 - PSYCH 632 Multiple Regression
 - SOC 716 Qualitative Methods
 - An alternate method or data analysis course pre-approved by the student's supervisor and Associate Director, Research and Doctoral Studies
- Students who have taken prior graduate-level statistics or data analysis courses can request an exemption from one of the two method or data analysis course requirements. The criteria for selecting an appropriate statistic or a data analysis course will be based on the students'

Proposed Graduate Studies Academic Calendar content:

research interest (for example a student may wish to do a qualitative study as part of their thesis). The student supervisor (in consultation with the student) and the Associate Director, Research and Doctoral Studies will need to approve the course selection.

- The student's supervisor, in consultation with the student and the Associate Director, Research and Doctoral Studies, may advise the student to take additional courses, anytime during the program, if the courses directly advance the student's work on their thesis.
- To maintain good standing during the coursework, students must maintain a minimum average of 75%.

• PhD Comprehensive Examination

- Students are required to meet the University-level PhD Comprehensive Examination minimum requirements outlined in the "[Minimum requirements for the PhD degree](#)" section of the Graduate Studies Academic Calendar (GSAC), with certain noted differences that are specific to the [Faculty of Engineering Comprehensive Examination minimum requirements](#):
 - Comprehensive examination purpose: Consistent with University-level minimum requirements.
 - Timing: Students must follow the Faculty of Engineering completion timelines whereby students shall complete their comprehensive examination before the end of their 4th term or 6th term in cases where the student is admitted to the PhD program without a completed Master's degree.
 - Committee: Students must follow the Faculty of Engineering committee composition guidelines which differ from the University-level minimum requirements in both number of committee members and committee makeup.
 - Who Chairs an examination: Students must follow the Faculty of Engineering Chair guidelines whereby the Chair is normally selected from outside of the student's home department.
 - Format / Content: Consistent with University-level minimum requirements but with additional information provided in the Faculty of Engineering Comprehensive Examination minimum requirements.
 - Academic integrity: Consistent with University-level minimum requirements.
- In addition to the University-level and Faculty-level PhD Comprehensive Examination minimum requirements, students in the PhD in Entrepreneurship and Organization program are also required to meet the following requirements:
 - The comprehensive examination questions will be proposed by the comprehensive examination committee. The committee will consist of faculty members that have taught the core courses. In the comprehensive examination, the examination committee will assign three research questions to the students. Students will select one of these questions or suggest a slightly modified version of one of the questions. In all cases the question(s) must serve to require the substantive breadth covering different courses. Students will write a research study that will address this question. The research study will include relevant background information, literature review, hypotheses, discussion of potential methods to test the hypotheses, a description of how results will be interpreted, and a discussion of possible problems in implementing the method and how those problems could be addressed. Students must submit the written study 10-14 days before the oral examination with the comprehension examination committee.

• PhD Thesis Proposal

- Students must present their thesis proposal to a Thesis Examination Committee. Students are required to follow the thesis proposal requirements outlined in [the Faculty of Engineering minimum requirements](#). In addition, the exam will include a critical assessment of students' thesis proposal based on a written report provided in advance. The student must submit the thesis proposal to the Thesis Committee at least one month prior to the examination. The thesis committee will assess students' thesis proposal on the basis of its potential contribution

Proposed Graduate Studies Academic Calendar content:

to knowledge (originality, quality, quantity), research adequacy and thoroughness, understanding of the subject (review of previous work, choice of project), suggested theoretical framework, methods, and presentation (organization, grammar, style, bibliography). Students must present their thesis proposal by the end of the 8th term.

- **PhD Thesis**

- Students must submit and defend a thesis by the end of the 12th term or the fourth year. A thesis must ensure that breadth of knowledge and skills are acquired by doctoral candidates through highly specialized, independent, original research which makes a distinct contribution of knowledge to the entrepreneurship and organization discipline. Students are required to follow the thesis examination requirements outlined in the [Graduate Studies Academic Calendar](#). The candidate will submit and later defend their thesis to their Thesis Committee.

Departmental approval date (mm/dd/yy):

Reviewed by GSPA (for GSPA use only) date (mm/dd/yy):

Faculty approval date (mm/dd/yy):

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

Senate approval date (mm/dd/yy) (if applicable):

**UNIVERSITY OF
WATERLOO**



**GRADUATE PROGRAM PROPOSAL
OF
DOCTOR OF PHILOSOPHY (PHD)
IN
ENTREPRENEURSHIP AND ORGANIZATION**

**Submitted to the
Ontario Universities Council on Quality Assurance**

VOLUME I - PROPOSED BRIEF

(SEPTEMBER / 2022)

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1. INTRODUCTION

1.1 Brief Listing of the Program

This is a research-based program offering a Doctor of Philosophy (PhD) in Entrepreneurship and Organization, offered by the Conrad School of Entrepreneurship and Business in the Faculty of Engineering at the University of Waterloo (UW). The PhD program will include course work, a comprehensive examination, a thesis proposal, and a thesis. The program will charge tuition consistent with all other PhD programs at the institution and will be delivered as a full-time program on-campus.

1.2 Method Used for Preparation of the Brief

The brief was prepared by the Conrad School of Entrepreneurship and Business in the Faculty of Engineering. The proposal was drafted by Dr. Shavin Malhotra (Professor of Strategy) with inputs from Mark Weber (Director, Conrad School). The proposal was also discussed internally with other Conrad School faculty members and the staff and their inputs were also included in drafting this proposal. It was approved by the School on 16/November/2021 and Faculty on 15/FEBRUARY/2022.

1.3 Objectives of the Program

The objective of this PhD program is to train students to conduct independent scientific research in the domains of Entrepreneurship and Organizations. Many business schools have departments and programs in “Management and Organizations”. This program’s focus on Entrepreneurship and Organizations captures both what makes it the same, and different, from related programs elsewhere. Like PhDs in Management and Organizations, this program builds on the fundamental theoretical foundations of the micro, macro and meso organizational behavior and strategy literatures. What makes the program different is that, instead of primarily using a management lens, or studying behavior in management contexts, this program applies an entrepreneurial lens and studies behavior in entrepreneurial contexts. Some specific areas of research include:

- New venture creation
- Small business and entrepreneurship
- Entrepreneurial strategy
- Entrepreneurship policy
- Entrepreneurial organizations
- Family-owned organizations
- Organizing entrepreneurial firms
- Entrepreneurial cognition and decision-making
- Corporate and social entrepreneurship
- Innovation and strategic renewal within existing organizations
- Organizational management and leadership

The new PhD program is consistent with the priorities identified in University of Waterloo’s strategic plan 2020-2025: “Be a global powerhouse for commercializing research,

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developing new enterprises and supporting business growth”. The proposed PhD program in Entrepreneurship and Organization will be the first such program offered in Canada. While there are universities that offer PhD in Management with specialization in Entrepreneurship, to the best of our knowledge, there is no such similar PhD program which is designed entirely around Entrepreneurship. A key strategy for the University of Waterloo is to continuously build on its distinguishing strengths: Experiential education, Entrepreneurship, and Transformative research – with entrepreneurship at the center of its strategic plan.

A PhD program in Entrepreneurship and Organization will not only complement UW’s strategic plan, but also other programs in the Conrad School, such as the Master of Business, Entrepreneurship and Technology (MBET) program. The School’s goal is to move towards a place where students view the School as their first choice for both entrepreneurial practice and entrepreneurial research. A PhD program at Conrad School will help achieve both these goals. In addition, the program will increase Conrad’s research intensity, assist faculty in advancing their research programs, and position the school as a center for thought leadership in Entrepreneurship and related fields.

In addition, by offering a PhD program that focuses predominantly on Entrepreneurship, UW will seize a strategic opportunity in the marketplace. Currently, in Ontario, there is no university that offers a PhD in Entrepreneurship and Organization. While the PhD program in Business at the Ivey Business School at Western University, does offer a specialization option in Entrepreneurship, it is markedly different from the program we are suggesting. In the Western program, the PhD is offered in Business Administration, and students have an option to enroll in one of the 11 possible disciplines in the third year. One of these 11 discipline options is Entrepreneurship. On the other hand, our PhD program is entirely oriented towards Entrepreneurship, unlike the Western program, where students will only focus on entrepreneurship towards the latter end of their PhD program.

There is a growing demand for tenure-track faculty in the area of entrepreneurship and innovation. A simple search of the Academy of Management placement website shows 164 advertised faculty openings in Entrepreneurship and Innovation, while there are 111 positions in Strategy, 99 in Organizational Behavior, and 113 in Human Resource Management. This shows that there are substantially more openings in Entrepreneurship than in other major management disciplines. Also, the number of openings in the area of Entrepreneurship has increased by 6.5 percent since last year.

While this program is designed most clearly to support students in pursuit of academic careers and positions at research intensive institutions, in addition to academic positions, students motivated to pursue work with government related to innovation and entrepreneurship can pursue opportunities to shape their doctoral studies accordingly. Some, though not all, of Conrad’s faculty have interests in this domain.

The program learning outcomes are listed below. By the end of this program, students will:

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- LO1 have a thorough knowledge of the entrepreneurship literature and more broadly of the organizational literature and be able to summarize, compare and review the main theories and frameworks in both literatures;
- LO2 understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature;
- LO3 devise theories and propose hypotheses or research questions to address an important theoretical and empirical gap in the entrepreneurship literature;
- LO4 demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research;
- LO5 explain and communicate complex theoretical ideas, constructs, and causal relationships clearly and effectively both through presentations and writing;
- LO6 make an original and substantial contribution to the discipline and also understand and appreciate limitations of one’s own work.

These learning outcomes have been mapped to the Doctoral Degree Level Expectations at the University of Waterloo and are presented in the following table:

<u>Doctoral DLEs</u>	LOs
<p>1. Depth and Breadth of Knowledge. A thorough understanding of a substantial body of knowledge that is at the forefront of their academic discipline or area of professional practice including, where appropriate, relevant knowledge outside the field and/or discipline.</p>	<p>1. have a thorough knowledge of the entrepreneurship literature and more broadly of the organizational management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature. 2. understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature 3. devise theories and propose hypotheses or research questions to address an important theoretical and empirical gap in the entrepreneurship literature</p>
<p>2. Research and Scholarship. a) The ability to conceptualize, design, and implement research for the generation of new knowledge, applications, or understanding at the forefront of the discipline, and to adjust the research design or methodology in the light of unforeseen problems; b) The ability to make informed judgments on complex issues in specialist fields, sometimes requiring new methods; and</p>	<p>1. have a thorough knowledge of the entrepreneurship literature and more broadly of the organizational management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature. 2. understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature 3. devise theories and propose hypotheses or research questions to address an important</p>

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<p>c) The ability to produce original research, or other advanced scholarship, of a quality to satisfy peer review, and to merit publication</p>	<p>theoretical and empirical gap in the entrepreneurship literature 4. demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research 6. make an original and substantial contribution to the discipline and also understand and appreciate limitations of one’s own work</p>
<p>3. Level of Application of Knowledge. The capacity to a) Undertake pure and/or applied research at an advanced level; and b) Contribute to the development of academic or professional skills, techniques, tools, practices, ideas, theories, approaches, and/or materials.</p>	<p>1. have a thorough knowledge of the entrepreneurship literature and more broadly of the organizational management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature. 2. understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature 3. devise theories and propose hypotheses or research questions to address an important theoretical and empirical gap in the entrepreneurship literature 4. demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research 6. make an original and substantial contribution to the discipline and also understand and appreciate limitations of one’s own work</p>
<p>4. Professional Capacity/Autonomy. a) The qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex situations; b) The intellectual independence to be academically and professionally engaged and current; c) The ethical behavior consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research; and</p>	<p>1. have a thorough knowledge of the entrepreneurship literature and more broadly of the organizational management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature. 3. devise theories and propose hypotheses or research questions to address an important theoretical and empirical gap in the entrepreneurship literature 4. demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research 6. make an original and substantial contribution to the discipline and also</p>

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<p>d) The ability to evaluate the broader implications of applying knowledge to particular contexts.</p>	<p>understand and appreciate limitations of one’s own work</p>
<p>5. Level of Communications Skills. The ability to communicate complex and/or ambiguous ideas, issues and conclusions clearly and effectively.</p>	<p>1. have a thorough knowledge of the entrepreneurship literature and more broadly of the organizational management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature 5. explain and communicate complex theoretical ideas, constructs, and causal relationships clearly and effectively both through presentations and writing</p>
<p>6. Awareness of Limits of Knowledge. An appreciation of the limitations of one’s own work and discipline, of the complexity of knowledge, and of the potential contributions of other interpretations, methods, and disciplines.</p>	<p>1. have a thorough knowledge of the entrepreneurship literature and more broadly of the organizational management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature. 2. understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature 4. demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research 6. make an original and substantial contribution to the discipline and also understand and appreciate limitations of one’s own work</p>

1.4 Admission Requirements

The admission requirements will include:

1. Applicants will ideally hold a graduate degree in Business, Management, Economics, Psychology, Sociology or a related social science discipline, and must have a minimum overall average of 75%, or equivalent, in the previous degree. Those with more technical degrees (e.g., Engineering, Computer Science, Statistics) may also be considered where there is clear evidence of interest in the application of those fields to human behavior and choice in organizational or entrepreneurial settings. Applicants should highlight any prior research or research assistantship experience in their applications. The graduate degree could be a one or two-year program. There are several programs at University of Waterloo whose graduates might wish to apply to our PhD program. These include: Master of Business,

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Entrepreneurship and Technology (MBET) (Conrad), Master of Management Sciences (MMSc), Master of Arts (MA) in Economics, Master of Accounting (MAcc), Master of Quantitative Finance (MQF), Master of Arts (MA) in Psychology. Those with degrees in computer science and engineering, especially where modeling human behavior has been a focus or interest, may also find this program appealing.

2. In exceptional cases, where a student has performed extremely well in a 4-year honours degree in one of the domains listed above, and excelled in a scholarly research project, applicants can gain direct admission to the PhD program with the agreement of the Committee, Associate Director, Research and Doctoral Studies, and the Director of the Conrad School.
3. GMAT or GRE results are required for domestic and international applicants to the PhD program. Applicants should have written these tests within the past five years.
4. All applicants must submit their transcripts, a CV and a 'Statement of Purpose' highlighting their academic background, prior experience in conducting research, area of research interest, their interest in Conrad's PhD program, and proposed research studies.
5. Applicants must also submit three letters of reference, of which at least two should be academic references and one can be professional.
6. Applicants must satisfy the University's [English language proficiency requirements](#). For this program, we will require the "higher scores" option (as listed in the above link).

1.5 Structure

The PhD program is structured in a way so as to meet the above listed learning outcomes. The students will first complete mandatory course work. They will then be tested on their ability to carry out an independent study through a comprehensive exam; this will be followed by a thesis proposal defense. Students will then submit a written thesis followed by an oral defense. Our intention is to have students complete the program by the end of their fourth year.

1. complete the required course work (in the first three terms of the program);
2. pass a comprehensive examination (by the end of Term 4);
3. present and defend a Thesis proposal (by the end of Term 8);
4. document their research work in a thesis document followed by an oral defence (by the end of Term 12).

Timeline

Activities	Terms											
	1	2	3	4	5	6	7	8	9	10	11	12
1: Courses												
2: Comprehensive exam												
3: Thesis proposal												

4: Thesis and defence																				
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A more detailed discussion of the courses and the other requirements is provided in Sections [1.6](#), [1.8](#) and [4](#). Moreover, under Assessment of Teaching and Learning (Section , [1.8](#)), we provide a detailed explanation on how assessments of these program requirements help achieve our learning outcomes.

Effect of Structure on Quality

The PhD program includes intensive coursework, a comprehensive exam, a thesis proposal, and rigorous research work culminating in the completion of a thesis document that will make an original and distinct contribution to entrepreneurship research. As students go through the program, they will gain experiential education and training in the area of entrepreneurship and organization. All of these elements are essential to the development of an academic scholar in the area of entrepreneurship. Students are expected to complete the program in 12 terms (4 years) with approximately one-third time devoted to coursework and the remaining time devoted to extensive research work. The PhD program in Entrepreneurship and Organization will provide students with a strong understanding of the strengths and limitations of a wide range of quantitative and qualitative methods, theories used in entrepreneurship research, while also developing their skills to carry out their own independent research. The length and depth of course work and research training is in line with most PhD programs at University of Waterloo (for examples, please see [PhD in Management Sciences](#); and [PhD in Pure Mathematics](#)).

1.6 Program Content

The program will focus on entrepreneurship and organization; however, within this area, students can focus on several areas of research such as, *new venture creation, small business and entrepreneurship, entrepreneurial strategy, entrepreneurship policy, entrepreneurial organizations, family-owned businesses, entrepreneurial cognition and decision-making, corporate and non-profit entrepreneurship, and organizational management and leadership*. While entrepreneurship is an established area in other business schools, rarely do these schools focus on such a wide array of topics in this field. Having an entrepreneurship doctoral program that encompasses many interesting topics will put Conrad School and UW at the forefront of Canadian entrepreneurship graduate programs.

The expertise of the tenured and the tenure-track faculty at Conrad School covers these areas of specializations and will allow them to contribute to graduate courses and supervisory committees. Evidence for this is provided in the curriculum vitae of the individual core faculty members ([Volume II](#)).

Coursework

The students will complete the coursework in the first 3 terms of the program. The course work will consist of five courses. These courses will help the student become familiar with advanced topics in entrepreneurship and in their particular area of study. During these

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courses, students will develop applied skills and learn methodologies that will become useful over the execution of their research work.

Required courses will include:

- Entrepreneurship Theory (New Course – BET 701)
- Organization Behavior (New Course – BET 702)
- Business Strategy (New Course – BET 703)
- Business Research Methods (New Course – BET 704)
- Two graduate level method or data analysis courses from the following options:
 - Applied Microeconometrics I (Existing course – ECON 622)
 - Advanced Analysis of Variance (Existing course – PSYCH 630)
 - Multiple Regression (Existing course – PSYCH 632)
 - Qualitative Methods (Existing course – SOC 716)
 - Quantitative Data Analysis for Management Sciences (Existing course – MSCI 609)

(Students who have taken prior graduate-level statistics or data analysis courses can request an exemption from one of the two method or data analysis course requirements). The criteria for selecting an appropriate statistic or a data analysis course will be based on the students' research interest (for example a student may wish to do a qualitative study as part of their thesis). The student supervisor (in consultation with the student) and the Associate Director, Research and Doctoral Studies will need to approve the course selection. We have consulted with all these departments (Economics, Psychology, Sociology, and Management Science), and they are all on board.

Details on these courses are provided under Section [4.4](#).

A supervisor, in consultation with the student and the Associate Director, Research and Doctoral Studies, may advise the student to take additional courses, anytime during the program, if the courses directly advance the student's work on their thesis.

Other Requirements

In addition to completion of the course requirements, students must complete the comprehensive examination, thesis proposal and thesis and defense. We discuss these briefly below and present a more detailed discussion around their assessments in Section [1.8](#).

Comprehensive Examination. Students will take their comprehensive exam in the fourth term. The comprehensive examination will measure the breadth and depth of the candidate's knowledge of the academic discipline, and the qualitative and quantitative methods in that discipline. A committee of faculty members who taught the core courses will set the comprehensive examination.

Students must complete the comprehensive exam before proceeding to their thesis. Please refer to UW's guidelines on [completion of the comprehensive exam](#).

Thesis Proposal. As part of the degree requirements, each student will present their thesis proposal to a Thesis Examination Committee. The exam will include a critical assessment of students' thesis proposal based on a written report provided in advance. The Committee will examine the candidate's understanding of the proposed research, suggested theoretical framework, methods, and whether the proposed research makes an original contribution to the candidate's academic discipline. The candidates will present their thesis proposal latest by the end of the 8th term.

The PhD thesis proposal experience serves two main purposes:

- To examine and approve students' thesis proposals;
- To verify that students have complete understanding of the proposed research, suggested theoretical framework, methods, and whether the proposed research makes an original contribution to the candidate's academic discipline.

Thesis and Defence. In terms 9 to 12, candidates will work on their thesis and aim to defend their thesis by the end of the 12th term or the fourth year. This thesis must contain original research which makes a distinct contribution of knowledge to entrepreneurship and organization research, and the candidate will submit and later defend their thesis to their supervisory committee.

Program Innovations

The inclusion of the multidisciplinary area of entrepreneurship in the program is an innovative aspect. The entire PhD program will focus on the context of entrepreneurship, which will be the first of its kind in Canada. Some innovative features include:

- During the course work and the comprehensive, students will get in-depth understanding of theories and methods that apply specifically to entrepreneurship research.
- Students will be exposed to a variety of different start-ups and entrepreneurs due to Conrad School's and UW's close association with Communitech and the Accelerator center.
- Conrad School and UW's access to start-ups will also provide excellent access for students to collect data for their theses.
- Easy access to one of the largest and most dynamic university entrepreneurship ecosystems embedded in one of the world's most dynamic tech innovation hubs is of high potential value to doctoral students in this area.

1.7 Mode of Delivery

This program will combine both coursework and research. The courses will normally be delivered in a face-to-face setting by the instructor. In these courses, students will commonly complete weekly reading assignments and prepare to participate in focused discussions in the classrooms. Students will be expected to accomplish independent and original research work. They will work closely with their supervisors and the work will

involve both a theoretical and an empirical component. It will also include a proposal defence, a written thesis report and a final oral defence.

1.8 Assessment of Teaching and Learning

Assessment of Student Achievement of the Learning Outcomes and DLEs

In the table below, each learning outcome is mapped to the DLEs and the program assessment activities.

LOs	PhD DLEs	Assessment activities
1. have a thorough knowledge of the entrepreneurship literature and more broadly of the organizational management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature.	1,2b,3,4b,4d,5,6	Independent research essays in courses, annotated bibliographies and literature reviews; presenting workshop and seminars in course work; comprehensive exam defense; thesis proposal defence and thesis defence (both oral and written).
2. understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature	1,2a,2b,3,6	Research essay and project assignments in courses; method course exam; comprehensive exam; thesis proposal defence; thesis and defence.
3. devise theories and propose hypotheses or research questions to address an important theoretical and empirical gap in the entrepreneurship literature	1,2,3,4	Thesis proposal defence; Thesis and defence (both oral and written); Conference paper submissions.
4. demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research	2a,2b,3,4,6	Thesis proposal defence; Thesis and defence (both oral and written)
5. explain and communicate complex theoretical ideas, constructs, and causal relationships clearly and effectively both through presentations and writing	5	Course presentations; Research essays in coursework; Thesis proposal defence; Thesis and defence (both oral and written); Students in the program will participate in conferences and present research seminars.
6. make an original and substantial contribution to the	2c,3,4a,6	Thesis proposal defence; Thesis and defence (both oral and written)

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discipline and also understand and appreciate limitations of one's own work		
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Below we provide more details around the assessment activities.

Research Essay: Instructors will assess students on their research essays in their coursework. Most courses will require an independently produced research essay or in-depth research-creation project. Instructors will assess students' essays for their level of critical engagement, breadth of knowledge, and lucidity and concision of expression.

Course Presentations: Instructors will also require students to present work orally to the class in the form of seminars. Through seminars, instructors can assess how well the students present their ideas, cogently and coherently summarize material for the class, engage the class in meaningful discussion, and present original research material in a compelling and accessible manner.

Course Exam (method courses): Method courses will have an end of the course exam that will assess students' knowledge, understanding (recalling, describing, recognising, relating, comparing) and application of different qualitative and quantitative methods in the field of entrepreneurship and more broadly in management. The exam will use a mix of multiple choice and essay questions to accommodate different student strengths.

Comprehensive Examinations: Students will take their comprehensive exam in the fourth term. The comprehensive examination will test students' competence in applying both the theoretical and methodological material covered in the courses. It will assess whether the student is ready to begin independent research work. The comprehensive examination questions will be proposed by the comprehensive examination committee. The committee will consist of faculty members that have taught the core courses. In the comprehensive exam, the examination committee will assign three research questions to the students. The students will select one of these questions or suggest a slightly modified version of one of the questions. In all cases the question(s) must serve to require the substantive breadth covering different courses. The students will write a research study that will address this question. The research study will include relevant background information, literature review, hypotheses, discussion of potential methods to test the hypotheses, a description of how results will be interpreted, and a discussion of possible problems in implementing the method and how those problems could be addressed. The students will submit the written study 10-14 days before the oral examination with the comprehension examination committee. The comprehensive will be assigned either a pass, passed conditionally, or re-examination. The purpose of these categories is to offer students early feedback on the degree to which they are demonstrating competence with the program material. In the case of re-examination, Conrad will follow the UW's guidelines on [completion of the comprehensive exam](#).

Thesis proposal. The thesis is the capstone assessment of the program. Its assessment begins with the submission and the defence of a proposal by the end of term 8. The students will present their thesis proposal in front of their Thesis Supervisory Committee (Thesis Committee here onwards), which will include at least three, and typically no more than six, faculty members as follows:

- The supervisor, along with the co-supervisor, if there is one.
- Two tenured or tenure-track faculty members from Conrad School.
- One tenured or tenure-track faculty member from outside Conrad School but from within University of Waterloo.
- In addition, at a later time but before the Thesis defence, one external member from outside UW will be added to the committee. This external member should have expertise in the area of research of the thesis and meet all other Graduate Studies and Postdoctoral Affairs criteria regarding the selection of external reviewers. Selection of the external examiner will be made by the Supervisor, in consultation with the Associate Director, Doctoral Studies.

The student must write a thesis proposal and submit it to the Thesis Committee at least one month prior to the examination. In their proposals, they should identify the research problem, review the relevant literature, describe the tasks planned to solve the problem, and propose a timetable for the completion of the project and the defence of the PhD thesis. Students, with the approval of their supervisor(s), may wish to distribute background working papers to members of the thesis committee to provide further evidence of background preparation.

The exam will start with students presenting (oral presentation) the main parts of their thesis proposal in about 30 minutes. Following the presentation, the students will answer questions from the thesis committee. The thesis committee will assess students' thesis proposal on the basis of its potential contribution to knowledge (originality, quality, quantity), research adequacy and thoroughness, understanding of the subject (review of previous work, choice of project), presentation (organization, grammar, style, bibliography), and overall quality. The thesis committee will decide if the proposal is passed, passed subject to completion of recommendations or the student will appear for a re-exam within six months of the exam.

Thesis and Defence. PhD candidates will submit a thesis to their thesis committee latest by the end of term 12 (end of the fourth year) of their program. Any student who requests an extension to this time limit will need to follow the graduate studies guidelines on [program extension](#). Students will be required to follow the University's [PhD thesis examination regulations](#).

A thesis must ensure that breadth of knowledge and skills are acquired by doctoral candidates through highly specialized, independent, original research which makes a distinct contribution of knowledge to the entrepreneurship discipline.

The completed thesis goes forward to defense when each of the internal faculty members on the student's thesis committee deem it ready to be evaluated. (Although per Graduate Studies guidelines, a negative assessment by the internal faculty members does not preclude the student to proceed to defence, such a case will be rare). The thesis is then submitted to a reviewer external to the university, who writes a report assessing the thesis project on the grounds of its contribution to knowledge in the area of entrepreneurship, adequacy and thoroughness of the research (review of previous work, theoretical arguments, robustness of the analytical methods, evaluation of results, validity of conclusions), presentation (organization, grammar, style, bibliography), and overall quality. To pass, the student must demonstrate, both in the written report and in the defence, an in-depth intellectual engagement with a scholarly field; a demonstrable ability to stay current on research in the field; the ability to carry out insightful, rigorous, and original research or research-creation; an appreciation of the complexities and limitations of knowledge; the intellectual independence and initiative to plan and accomplish a long-term research project; the ability to communicate one's research; the ability to produce original, sophisticated, convincing work of a quality to satisfy peer-review.

Documenting and Demonstrating the Level of Performance of Students

The level of student performance in terms of learning outcomes will be assessed using a number of sources of data. Each source of data will provide an indicator of the level of achievement for learning outcomes. Below is a list of planned data sources.

- Assessment of student deliverables, such as course assignments, course exams, course project reports, comprehensive exams, thesis proposal, and thesis defence.
- Annual supervisory meetings. As part of the annual supervisory committee review, students will be asked to complete a self-assessment, reflecting on their intellectual and professional growth through the past year, setting goals for the coming year.
- Students' activities in the public sphere: offering conference papers, engaging in teaching activities—each student will be offered a teaching assistantship in their second and third year of the program and where possible, an opportunity to teach a course during their third and fourth year of the program), publishing work in academic and non-academic venues, securing external funding, etc. All of these will be tracked by the supervisor as part of the annual supervisory meetings with the students.
- The success of the proposed program will also be evaluated by students themselves through exit surveys and reflective essays upon degree completion.
- Alumni surveys to measure the degree to which past students believe they achieved program-level learning outcomes and overall satisfaction with the program. It will be collected every three years.
- Thesis assessment forms: the thesis committee will assess the thesis on the depth and breadth of knowledge, novelty, research and scholarship, critical thinking, application of knowledge, communication skills (both written and oral), robustness of methods used, and awareness of limitations of the study, using a rubric with a three point likert scale (does not meet expectations, meet expectations, exceed expectations).
- Further the formal IQAP cyclical program review process will offer a detailed reflection on the success of the program.

1.9 Fields in a Graduate Program [optional]

Not applicable.

2. HUMAN RESOURCES

The Conrad School of Entrepreneurship and Business currently has a total of fourteen full-time faculty members. Faculty who are primarily engaged in entrepreneurship and management research include eight tenured or tenure-track faculty members (all of whom are able to teach and supervise PhD students), and an additional three lecturers who are engaged in applied entrepreneurship research. Active areas of research include but are not limited to: financing of new entrepreneurial ventures, entrepreneurship strategy, entrepreneurship education, international entrepreneurship, leadership and decision-making, entrepreneurship policy and ecosystems, social enterprise and organizational behaviour. The diversity of research areas within the School ensures that PhD students will have opportunities to pursue a wide range of topics in the entrepreneurship area.

Further, faculty members have a wide range of methodological expertise from sophisticated econometric research using large-scale databases, to experiments, to survey research, to data science, to policy analysis and ethnography.

Our existing faculty and administrative support staff have capacity to manage the requirements of launching a new doctoral program. We also anticipate the addition of several more tenure-stream faculty over the next four years to accommodate other program growth at Conrad that has been approved in principal by the Dean of Engineering. Finally, we will add of a new role of Associate Director, Research and Doctoral Studies. This new role will have clear responsibility for doctoral program oversight and leadership, but also for spearheading research intensification and support initiatives that are part of Conrad’s strategic plan and objectives.

2.1 Resources for Graduate Programs Only

All nine faculty members will be eligible to supervise the PhD students. The School is in the process of obtaining the ADDS (Approved Doctoral Dissertation Supervisor) status for these faculty – they all meet the Graduate Studies and Postdoctoral Affairs (GSPA) [qualifications for the ADDS status](#).

For the first three years of the PhD program, we anticipate the six tenured faculty members to share the supervisory load of the PhD students. Given our projections (See [Table 4](#)), this would amount to supervision of 2 students per faculty member in the first three years. We anticipate that both our tenure-track faculty members (who are currently not tenured) would also begin to supervise from Year 4 and we expect one or two new hires who would also supervise PhD students from Year 4 onwards.

In Section [2.6](#), we elaborate on the quality of Conrad School faculty to contribute to the PhD program.

2.2 List of Faculty by Field

The Conrad School of Entrepreneurship and Business currently has a diverse faculty group consisting of various expertise and backgrounds. Our eight tenured or tenure-track faculty members (all of whom are able to teach and supervise PhD students) include:

Harvir Bansal, Tenured Associate Professor, specializes in methods and data analytics, marketing, and services marketing;

Nada Basir, Tenure-track Assistant Professor, specializes in strategy, organizational and institutional theory, start-ups, and social enterprise;

Janet Boekhorst, Tenure-track Assistant Professor, specializes in entrepreneur, leader, and employee wellbeing; compassion in the workplace; star performers; and diversity and inclusion.

Victor Cui, Tenured Associate Professor, specializes in entrepreneurship, strategy, and international business

Margaret Dalziel, Tenured Associate Professor, specializes in entrepreneurship, entrepreneurship policy, entrepreneurship ecosystems and entrepreneurship support systems

Shavin Malhotra, Tenured Full Professor, specializes in organizational strategy, entrepreneurship, and international business;

Horatio Morgan, Tenured Associate Professor, specializes in immigrant entrepreneurship, and internationalization of small and medium sized enterprises

Mark Weber, Tenured Full Professor, specializes in organizational behavior, social psychology, decision-making and leadership;

The detailed CVs of these faculty members are provided in [Volume II](#).

In addition to these core research faculty, Conrad School has three full-time lecturers who conduct and publish research, two as part of their normal duties. They are:

Christopher Holt, Lecturer, specializes in entrepreneurship education

Marc Hurwitz, Lecturer, specializes in leadership and collaboration

Doug Sparkes, Lecturer, specializes in technology innovation and entrepreneurship education

Table 1 lists the above faculty members. Please note that currently only Howard Armitage holds the Approved Doctoral Dissertation Supervisory (ADDS) status. The School has initiated the process of applying for the ADDS status for the remaining faculty members. Since Conrad School has not had a research graduate program, this process has been unnecessary till now. All of the faculty members meet the GSPA qualifying requirements for the ADDS status. The Director of the Conrad School has submitted these files for consideration and we are awaiting formal recognition.

Currently, the Conrad School does not have any approved fields of study and does not plan to propose any for the new PhD program. Table 1 was completed by IAP.

TABLE 1

Faculty Members Involved in Proposed Program				
Faculty Name	Rank (Professor, Assistant, etc.)	Gender (M/F/U)	Home Unit ¹	Supervisory Privileges ²
Harvir Bansal	Associate Professor	M	Conrad School	Full
Nada Basir	Assistant Professor	F	Conrad School	Full, awaiting formal approval
Janet Boekhorst	Assistant Professor	F	Conrad School	Full
Victor Cui	Associate Professor	M	Conrad School	criteria believed to be satisfied, approval in process
Margaret Dalziel	Associate Professor	F	Conrad School	Full
Shavin Malhotra	Professor	M	Conrad School	Full
Horatio Morgan	Associate Professor	M	Conrad School	criteria believed to be satisfied, approval in process
Mark Weber	Professor	M	Conrad School	Full
Christopher Holt	Lecturer	M	Conrad School	Co-supervisor
Marc Hurwitz	Lecturer	M	Conrad School	Co-supervisor
Doug Sparkes	Lecturer	M	Conrad School	Co-supervisor

Notes:

1. This is the home department of the faculty member associated with the program under review.
2. The level of supervisory privileges held by each faculty member, e.g. full, masters only, co-supervision only, etc.

2.3 External Operating Research Funding

Table 2 presents the external research funding by source received by the core faculty for the past seven years. The table was compiled by IAP.

TABLE 2

Operating Research Funding (\$) by Source and Fiscal Year¹				
Fiscal Year²	Tri-Agency Awards³	Public Sector and Non-Profit Funding⁴	Internal Awards	Total
2012/13	\$0	\$130,321	\$0	\$130,321
2013/14	\$15,000	\$437,168	\$0	\$452,168
2014/15	\$56,500	\$410,763	\$0	\$467,263
2015/16	\$67,188	\$584,675	\$0	\$651,863
2016/17	\$67,373	\$138,400	\$0	\$205,773
2017/18	\$59,048	\$785,074	\$0	\$844,122
2018/19	\$74,188	\$166,200	\$1,520	\$241,908
Totals	\$339,297	\$2,652,601	\$1,520	\$2,993,418

Notes:

1. Data is reported on the primary investigator only. Table includes research awards for primary investigators included in Table 1.
2. Data is reported on the fiscal year. Waterloo's fiscal year runs from May 1st in one year until April 30th in the subsequent year, and includes three consecutive terms – Spring, Fall, and Winter. Please update the seven year window as appropriate.
3. Excludes equipment grants (e.g. NSERC RTI).
4. Excludes equipment grants and internal awards (e.g. CFI, UW-RIF, UW-SSHRC).
5. Includes funding received from Industry partners.
6. Includes UW-RIF and UW-SSHRC.
7. Includes NSERC-RTI and CFI.

2.4 Graduate Supervision

Table 3 presents the number of completed thesis supervisions for each of the core faculty members over the course of their career, and the number of thesis supervisions currently underway.

TABLE 3

Completed and Current Numbers of Thesis Supervisions by Faculty Member						
Faculty Name and Rank ¹	Total Completed Over Career ²			Current ³		
	Master's	PhD	PDF	Master's	PhD	PDF
Harvir Bansal, Associate Professor	0	0	0			
Nada Basir, Assistant Professor	0	0	0			
Janet Boekhorst, Assistant Professor	0	0	0			
Victor Cui, Associate Professor	0	1	0		1	
Margaret Dalziel, Associate Professor	2	0	0			
Shavin Malhotra, Professor	12	1				
Horatio Morgan, Associate Professor	5	0	0			
Mark Weber, Professor	0	1	0			

Notes:

1. Faculty members and ranks as specified in Table 1.
2. Number of thesis supervisions completed thus far over the faculty member's career.
3. Number of current thesis supervisions underway for each faculty member.

Table 3 understates the supervision capacity of Conrad School faculty. As an example, Mark Weber was significantly involved in the research training of several doctoral students at University of Toronto, including publishing two-authored papers with doctoral students, but was not their direct supervisor. Further, many faculty have served actively on the committees of doctoral students in other areas. For example, almost all of these faculty members have served as dissertation committee members for Management Science PhD students. Conrad School faculty have not had the opportunity to supervise research students in the absence of research programs.

2.5 Commitment of Faculty from Other Graduate Programs/Other Institutions

The Conrad School has developed collaborations with other units within the University of Waterloo that will provide additional support to the PhD program. Of particular relevance are collaborations with the Department of Management Sciences, Department of Economics and the School of Accounting and Finance. Currently, for example, many Conrad School faculty are cross-listed in the Department of Management Sciences, and can participate as co-supervisors or committee members in their PhD program. We also sustain positive relationships with the School of Accounting and Finance, which can offer support

of finance related projects, and in which there are several experimentalists with complementary interests to Conrad School faculty. While the main supervisor of our PhD students will be from Conrad School, the other members of the supervisory committees may be from other Departments/Schools at UW, including Management Sciences, Economics and Accounting and Finance, and possibly the industrial/organizational group in Psychology. In addition, one of the core courses will be housed in either of these Departments/School.

2.6 Quality of Faculty

Research quality of faculty is primarily measured through their publications, citations and success in obtaining funding from external agencies. By these measures, the Conrad School faculty has had considerable success considering that there are currently only eight tenure-stream faculty members. Conrad School faculty have secured nearly \$3 million (see [Table 2](#)) in funding over the past 7 years to support their research despite not having access to graduate research students and when funding through agencies such as SSHRC has been historically challenging.

Conrad School tenure-stream faculty members have authored or co-authored 89 papers in the management literature in the last seven years (please see Vol. II). In addition, the faculty have published four books or monographs and four technical papers during the same period. The published research of Conrad's seven tenure-stream faculty has attracted almost 15,000 citations (Google Scholar). The group has produced 22 papers that have attracted at least 100 citations or more, 11 papers with 250 citations or more and 5 papers with 500 citations or more. Two thirds of the group have at least one paper that has more than 100 citations. Our newly hired junior faculty member arrived on July 1, 2018 with nine peer reviewed publications, including a solo authored piece in a Financial Times 50 journal. In addition, Shavin Malhotra was appointed as the inaugural Conrad Research Excellence Chair. Since Shavin's appointment, we have added two additional Conrad Research Excellence Chairs – Janet Boekhorst and Victor Cui. These appointments are based on a set of criteria to select those whose recent research output is comparable to the best researchers anywhere. We have a small but dense cluster of top-flight research talent and its trajectory is unquestionably positive.

Besides research, Conrad School has rapidly built a reputation for the quality of its teaching. Members of the faculty have received numerous teaching awards within the University of Waterloo and elsewhere. Collectively, the Conrad School faculty has both research and teaching expertise to contribute substantively to this PhD program.

3. PHYSICAL AND FINANCIAL RESOURCES

As this is a PhD program, the tuition for this program is expected to be comparable to the rate of \$2,254 per term for domestic students and \$7,396 per term for international students that is currently associated with the PhD program at the University of Waterloo as of Fall 2021. It is anticipated that the majority of the students will be domestic students. As we show below in Table 4 on 'Projected student intake and enrolment', we are not planning a large intake of students, so we are confident that we will be able to get enough strong domestic applications. Also, unlike engineering, where there may be a larger cohort

of international students, most PhD programs in Strategy, Entrepreneurship, and Organizational Behavior have a much more balanced cohort of domestic and international students. For example, the link below shows the current PhD students at Ivey Business School. Of those who mention their previous education, in the area of Entrepreneurship, there are three domestic and three international students, in strategy, there are two domestic and three international students, and in OB, there is one domestic and one international student.

<https://www.ivey.uwo.ca/phd/students/>

Conrad School has sufficient physical space to support the PhD program and will not require any additional physical or computer resources to sustain the program.

3.1 Library Resources

This section is written by a representative of the University Librarian, using a standard format.

Report provenance

Written by Rachel Figueiredo, Engineering & Entrepreneurship Librarian,
rachel.figueiredo@uwaterloo.ca

Reviewed by Jennifer Haas, Department Head, Information Services and Resources, Davis Centre Library, j2haas@uwaterloo.ca

Victoria Chu, Associate University Librarian, Learning, Research and User Services,
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Level of support summary

The Library provides a high level of support for the existing programs and courses offered through the Conrad School of Entrepreneurship and Business. Currently, a Liaison Librarian with responsibilities for supporting multiple engineering departments and programs, as well as campus-wide curricular and co-curricular entrepreneurship initiatives, supports the Conrad School. This Librarian is highly-skilled with expertise to support the research needs of the PhD program in Entrepreneurship and Organization, however actual support may be limited by capacity. Should the PhD program in Entrepreneurship and Organization require more extensive and dedicated librarian support beyond what is currently available, the Library is committed to engaging in discussions with the Conrad School to explore implications and opportunities.

Strengths of support provided

The University of Waterloo Library curates a collection for both the practical and theoretical approaches to entrepreneurship studies. This collection includes research databases, full text journals, and monographs. Some of the research databases of particular interest to these subject areas include Frost and Sullivan, IBISWorld, MarketLine Advantage, Scopus, Business Source Elite, Factiva, and ABI/Inform. The Library provides access to journals of particular relevance to the Conrad School, including the Academy of Management Journals, Administrative Science Quarterly, Organization Science, Entrepreneurship Theory and Practice, and Journal of Business Venturing. In addition to

the local collection, the University of Waterloo Library partners with other Ontario and Canadian universities to further expand access to relevant resources. Such collaborations include the Ontario Council of University Libraries (OCUL) and the Canadian Research Knowledge Network (CRKN). Assuming the Library's acquisitions budget remains stable, current collection strengths would support the new program. Should new subject areas emerge or if research intensity develops in subject areas currently outside of collection priorities, the Library is committed to engaging in discussions to articulate collection needs and assess funding implications.

The Engineering and Entrepreneurship Librarian provides research, teaching and learning support for students and faculty. Instructional support includes the development of research guides as well as the preparation of classroom sessions and outcomes-based workshops. The Librarian also offers weekly office hours in the Conrad School to consult with individuals to support coursework, market research, publication of research, meeting open access requirements, and copyright.

More information

The Library would be happy to be meet with the program reviewers to discuss this report and answer their questions.

For additional information about University of Waterloo Library and the support it provides for programs, please visit <https://uwaterloo.ca/library/about/policies-and-guidelines/support-academic-programs>.

3.2 Laboratory Resources

Not applicable.

3.3 Computer Facilities

PhD students will have access to the Department's printers as well as the support of the Engineering Computing Department. Students are required to provide their own laptops and standard software. All tailored software that directly relates to the research will be provided by the Conrad School.

3.4 Space

The Conrad School occupies most of the second floor of Engineering 7 at the University of Waterloo. This space includes ample offices, seminar rooms, and classroom space to support the proposed program. Doctoral students will share dedicated office space, with two PhD students per office.

In addition, there is lounge space that can be shared with faculty and lounge space that can be shared with professional Master's students.

3.5 Financial Support

Conrad School will follow the minimum value of Graduate Research Studentships mandated for Faculty of Engineering PhD students (please see <https://uwaterloo.ca/engineering/future-graduate-students/funding-and-awards>).

Currently, this amounts to \$25,000/year for four years (12 terms). Students may also have the opportunity to take on assignments as Teaching Assistants (TA) in Conrad's undergraduate and Masters programs, and also in the clinical and professional practice courses of the undergraduate curriculum (please refer to UW's [compensation rates](#)). In addition, these students will be eligible to apply for [Faculty of Engineering Scholarships and Tri-Council Scholarships](#).

4 CURRICULUM

4.1 The Intellectual Development and the Educational Experience of the Student

Seminars are a vital part of most PhD programs and give faculty and students an opportunity to discuss their research topics. It fosters critical debate, important in developing one's grasp and understanding of their subject. In the PhD program, courses on organizational behavior, business strategy and entrepreneurship theory, will be offered predominantly as seminars as opposed to lectures. These seminars will facilitate the integration of related sub-disciplines, critical thinking, and the synthesis of ideas often crossing disciplinary boundaries. Fundamental to these seminar courses are group discussions among peers, facilitated by faculty, and student presentations. Students will often be invited to take a lead role in the preparation of a seminar and chairing the discussion.

Seminars will help PhD students learn by:

- applying knowledge from lectures and background reading;
- testing their understanding of their subjects and developing new insights;
- observing other people's approaches and ideas;
- clarifying any concepts that are not clear.

In addition to seminars, a student's supervisor will support the student's progress through the program through regular meetings, including an annual committee meeting, meetings to discuss preparation for the comprehensive exams and regular thesis meetings. When appropriate, faculty in the program will engage students as research assistants, where they can collaborate and co-publish papers on topics of their interests and expertise. This will ensure that students are provided with support and mentorship in learning the processes involved with preparing and disseminating intellectual work.

While PhD students will be encouraged to participate in workshops on teaching and research offered by UW, these will not be a part of their program deliverables.

- a. The students will be asked to participate in the UW orientation program. In addition, Conrad School will also run its own 3-day orientation event, which will introduce new students to Conrad School and its PhD program, discuss the PhD process, deliverables, and learning outcomes. We will invite representatives from Velocity, Communitech and Grand Innovations to talk about their centers and share information on their data hubs and data collection opportunities at their centers. The event will also explore what it means to work in academia, including various aspects related to the publication of their research. We will

also invite a representative from the Library, who will share specific library services and electronic resources of interest to PhD students. We will also host a citation and bibliography workshop through the University of Waterloo's writing and communication center during the first term of the program. In addition, in the first year, we will introduce site visits at Velocity, Communitel and Grand Innovations for PhD students to meet the startup community in Kitchener-Waterloo. Finally, we will also invite entrepreneurs from the Kitchener-Waterloo region to give talks to both our PhD and MBET students, where they discuss their struggles and successes as an entrepreneur. This will provide exposure for our PhD students to interesting research questions they can pursue as part of the course term papers or for their thesis.

Conrad School will offer up to \$2,500 per student per year for conference travel. However, this funding will be restricted to students who are presenting their research at a conference. In addition, students will be encouraged to apply for travel funding through the Graduate Studies Research Travel Assistantship program (<https://uwaterloo.ca/forms/graduate-studies/graduate-studies-research-travel-assistantship-application>).

4.2 Program Regulations

The admission policies have been discussed in detail earlier (please see [1.4](#)). We have also discussed the course requirements (see [1.6 'course requirements'](#)), comprehensive and thesis evaluation procedures (see [1.8](#)) and annual student assessments (see [1.8 "Documenting performance of students"](#)) earlier. There are no co-op placements in this program.

To maintain good standing during the coursework, students have to maintain a minimum average of 75%.

4.3 Part-time Studies

This will be a full-time program. There are no part-time options.

4.4 Curriculum

Below we provide a brief description of the courses. We have also included the course activation forms for each of the new courses at the end of the report; please click titles to see these forms.

[Entrepreneurship Theory \(New Course – BET 701\)](#)

This course will offer insights into the main theories and issues in the studies of entrepreneurship and innovation. It will also discuss the complex and dynamic reality of the entrepreneur and the innovating organization as well as explore research traditions, methodologies, and approaches in entrepreneurship research.

[Organizational Behavior \(New Course – BET 702\)](#)

This course will offer an understanding of classic and contemporary issues in organizational behavior. Drawing on theory and research in psychology, social psychology, and

organizational behavior, this course will explore individual, interpersonal, and group processes in work organizations.

[Business Strategy \(New Course – BET 703\)](#)

This course will examine the current state of knowledge in strategic management. Topics may include the sources of competitive advantage, the role of industry evolution and technology, the organization of top management, and managerial decision-making and cognition. It will also cover alternative theoretical perspectives and available empirical evidence related to these topics.

[Business Research Methods \(New Course – BET 704\)](#)

The course will examine the different stages in the research process beginning with how to frame research questions, speculate hypotheses, understand the merits of alternative research methods, and cover topics and provide examples in areas such as experimental design, survey design, case studies, and archival research. By the end of the course, students will be prepared to critically evaluate research method and design choices for their own research.

In addition to the above four courses offered through the Conrad School, students will also be required to successfully complete one graduate level method or data analysis course from the following options:

- [Applied Microeconometrics I](#) (Existing course – ECON 622)
- [Advanced Analysis of Variance](#) (Existing course – PSYCH 630)
- [Multiple Regression](#) (Existing course – PSYCH 632)
- [Qualitative Methods](#) (Existing course – SOC 716)
- [Quantitative Data Analysis for Management Sciences](#) (Existing course – MSCI 609)

Note: With two recent senior faculty hires, the current faculty at Conrad School can readily staff the four new courses listed here through the rearrangement of current teaching commitments.

4.5 Collateral and Supporting Departments

As stated earlier, there are natural synergies between Conrad School and a number of other excellent research-intensive departments at UW, including Management Sciences, within our own Faculty, and the School of Accounting and Finance, and the Department of Economics in the Faculty of Arts.

4.6 Organizational Structure

This PhD program will be based in the Conrad School of Entrepreneurship and Business, Faculty of Engineering. The Faculty of Engineering will be involved in offering this program and no other institutions other than the University of Waterloo will be directly involved in offering this program. The PhD program in Entrepreneurship and Organization will be

managed by an Associate Director, Doctoral Studies, who will report to the Director of the Conrad School.

5. PROJECTED ENROLMENT

Enrolment projections are based on an anticipated intake of two full-time domestic students each Fall and one full-time international student every second Fall, when the program reaches full capacity in Year 6. Further increases in student enrollment may be considered if there is sufficient student demand and the Conrad School has sufficient capacity for supervision of research projects.

The program is expected to begin its first intake by Fall 2023.

Table 4 shows the projected student intake and total fiscal year enrolment in the proposed program over the next nine fiscal years.

TABLE 4

Projected Student Intake and Enrolment					
Fiscal Year	FULL-TIME				
	Fall Intake ¹ (Student Headcount)		Fiscal Year Full-Time Enrolment (FFTE) ²		Total Fiscal year Enrolment (FFTE)
	Domestic fee-paying	International fee-paying	Domestic fee-paying	International fee-paying	
2023/24	2	0	3.9	0	3.9
2024/25	2	1	9.3	1.9	11.2
2025/26	2	0	14.4	2.4	16.8
2026/27	2	1	18.9	3.7	22.6
2027/28	2	0	20.4	3.9	24.3
2028/29	2	1	20.4	4.7	25.1
2029/30	2	0	20.4	3.9	24.3
2030/31	2	1	20.4	4.7	25.1
2031/32	2	0	20.4	3.9	24.3

¹The PhD student intakes will only be in the Fall term of every year.

²Fiscal year enrolment (FFTE) is the total student enrolment over the three terms in the fiscal year (Spring + Fall + Winter). A full-time graduate student will generate 1.0 FFTE per term, and 3.0 FFTE in a fiscal year. Note that student retention is estimated using existing Arts PhD transitions and numbers are rounded to one decimal place. By the start of the fifth year (2027/28), the first year cohort of students will have graduated. Similarly, by the sixth year, our second year cohort will have graduated and so on.

6. FINANCIAL PLAN

A financial viability analysis (FVA) investigating the financial parameters and assumptions of this proposed program was constructed by Institutional Analysis and Planning (IAP) and discussed in detail with the Faculty of Engineering. IAP has not identified significant financial challenges to this proposal moving forward with the proposed enrolment, tuition rates, and costs as outlined in the FVA. The Faculty of Engineering has acknowledged that this program will require additional financial resources in excess of what is generated by the program to operate, and that these will be the responsibility of the Faculty of Engineering. The financial viability analysis was approved by the Provost on December 15, 2021.

Appendix A – Summary of Learning Outcomes Mapped to Courses and Assessment Methods

Specific GDLEs and Associated Learning Outcomes	Course					Assessment method							
	MSCI 609\ECON 622\PSYCH 630\PSYCH 632\ SOC 716	BET 701	BET 702	BET 703	BET 704	Research Essays	Literature reviews	Quizzes/Tests	Comprehensive Exam	Data interpretation, synthesis, visualization	Thesis proposal defense	Thesis defense	Presenting workshop/seminar
1. Depth and Breadth of Knowledge													
LO1. have a thorough knowledge of the entrepreneurship literature and more broadly of the organizational management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature.		✓	✓	✓		✓	✓	✓	✓		✓	✓	
LO2. understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓
LO3. devise theories and propose hypotheses or research questions to address an important theoretical and empirical gap in the entrepreneurship literature					✓	✓					✓	✓	

2. Research & Scholarship														
LO1. have a thorough knowledge of the entrepreneurship literature and more broadly of the management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature.			✓	✓	✓		✓	✓				✓	✓	✓
LO2. understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	
LO3. devise theories and propose hypotheses or research questions to address an important theoretical and empirical gap in the entrepreneurship literature						✓	✓					✓	✓	
LO4. demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research							✓					✓	✓	
LO6. make an original and substantial contribution to the discipline and also understand and appreciate limitations of one's own work												✓	✓	✓
3. Level of Application of Knowledge														
LO1. have a thorough knowledge of the entrepreneurship literature and more broadly of the management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature.			✓	✓	✓		✓	✓	✓	✓		✓	✓	
LO2. understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	

LO3. devise theories and propose hypotheses or research questions to address an important theoretical and empirical gap in the entrepreneurship literature						✓	✓					✓	✓	
LO4. demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research							✓					✓	✓	
LO6. make an original and substantial contribution to the discipline and also understand and appreciate limitations of one's own work												✓	✓	✓
4. Professional Capacity/Autonomy														
LO1. have a thorough knowledge of the entrepreneurship literature and more broadly of the management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature.			✓	✓	✓		✓	✓	✓	✓		✓	✓	
LO3. devise theories and propose hypotheses or research questions to address an important theoretical and empirical gap in the entrepreneurship literature							✓					✓	✓	
LO4. demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research							✓					✓	✓	
LO6. make an original and substantial contribution to the discipline and also understand and appreciate limitations of one's own work												✓	✓	✓
5. Level of Communications Skills														
LO1. have a thorough knowledge of the entrepreneurship literature and more broadly of the management literature and be able to summarize,			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	

compare and review the main theories and frameworks in the entrepreneurship literature.														
LO5. explain and communicate complex theoretical ideas, constructs, and causal relationships clearly and effectively both through presentations and writing			✓	✓	✓		✓	✓				✓	✓	✓
6. Awareness of Limits of Knowledge														
LO1. have a thorough knowledge of the entrepreneurship literature and more broadly of the management literature and be able to summarize, compare and review the main theories and frameworks in the entrepreneurship literature.			✓	✓	✓		✓	✓	✓	✓		✓	✓	
LO2. understand, apply and critically evaluate different scientific research methods, whether quantitative or qualitative, to test theory and hypotheses in the entrepreneurship literature	✓		✓	✓	✓	✓			✓	✓	✓		✓	✓
LO4. demonstrate self-direction and originality in planning, executing, tackling and solving problems in academic research							✓					✓	✓	
LO6. make an original and substantial contribution to the discipline and also understand and appreciate limitations of one's own work												✓	✓	✓



New Program Response to External Reviewers' Report **Entrepreneurship and Organization (PhD)** September 2022

General Commentary

We are grateful to the reviewers for their excellent suggestions. We have made concerted efforts to incorporate their suggestions or address their concerns.

Program and Dean's Responses to External Reviewers' Recommendations

FOR THE STUDENTS

1. **TRAINING**

- a) Provide a **stronger foundation of training** both in the foundations of the field and in research methods (through more coursework, course requirements that can be waived with prior experience, a narrower set of admissions criteria for prior training, workshops or other additional training, etc.)

Program Response

We have increased the course requirement to include an additional method/statistics course. In the revised curriculum, along with the four courses on Entrepreneurship Theory, Organizational Behavior, Business Strategy and Business Research Methods, students will opt for two additional method courses from the available courses. However, students who have taken an earlier graduate-level statistics course or a data analysis course can opt for only one of the additional method courses. We have made this change on page 9 of our proposal. Having considered the question of a narrower set of admission criteria, we again consulted the admissions criteria of comparable programs, finding them to be similarly broad. We think this makes sense, given the idiosyncrasies of faculty member interest, research expertise and research programs. We have, however, added the requirement of elaboration with respect to applicants' research experience to augment our understanding of their skills and likelihood for program success.

Dean's Response

PhD programs within the Faculty of Engineering have slightly varying coursework requirements depending on the academic unit. As such Conrad School of Entrepreneurship and Business will have sufficient flexibility, through established processes, to modify coursework requirement of their program(s) and recognize prior experience and training.

- b) Build **independent research experience** (and the starting point for a publication pipeline) earlier in the structure of the program.

Program Response

We looked at other Ph.D. programs and found that our timeline allows students to start independent research earlier than other programs. Most of these programs have five or six semesters of courses and then a comprehensive exam, so the earliest that students begin to work on independent research is the start of the third year (e.g., see the [Ph.D. program at UBC Sauder School of Business](#)). In our timeline, the students will complete their comprehensive exam by the end of the fourth term, so they will start their independent research (working on their thesis proposal) at the start of their fifth term (before the end of the second year). By maintaining a good balance of course requirements for students, we can initiate students towards independent research earlier than in other Ph.D. programs in Business. In addition, several seminar courses, such as Business Strategy and Organizational Behaviour, will require students to write independent research essays/papers as part of their deliverables.

Dean's Response

In general, doctoral students in the Faculty of Engineering get introduced to, and progressively engage in research at an early stage, mostly right from the start of their program. This happens through interaction with the supervisor, exploration of research topic(s) and methods, and building background knowledge.

- c) Require sufficient **training and/or experience in teaching** so that students will graduate with a teaching portfolio sufficient to the demands of the academic job market.

Program Response

We have now included Teaching Assistantship as a mandatory part of student training in the program. Each student will be offered a Teaching Assistantship during the second and the third year of the program and where possible, an opportunity to teach a course during the third or the fourth year. We have incorporated this change on page 14 of the proposal.

Dean's response

Faculty of Engineering has put in place a unique training program called ExpectAtions, which is mandatory for all teaching assistants. The program covers a range of topics including skills development, roles & responsibilities, professional ethics, and wellness. At the University level, the Centre for Teaching Excellence (CTE) offers teacher training which is open to all PhD students who can receive a Certificate in University Teaching (CUT).

- d) Find ways of **exposing students in the program to the school's network and the region's entrepreneurial ecosystem.**

Program Response

We have included several modifications to expose students to the Kitchener-Waterloo entrepreneurial ecosystem.

- a. During the three-day orientation event, we will invite representatives from Velocity, Communitech and Grand Innovations to talk about their centers and share information on their data hubs and data collection opportunities at their centers.
- b. In the first year, introduce site visits at Velocity, Communitech and Grand Innovations for PhD students to meet the startup community in Kitchener-Waterloo.
- c. Invite entrepreneurs from the Kitchener-Waterloo region to give talks to both our PhD and MBET students, where they discuss their struggles and success as an entrepreneur. This will provide expose our PhD students to interesting research questions they can pursue as part of the course term papers or for their thesis.

We have incorporated these changes on pages 24-25 of the proposal.

Dean's Response

The Engineering faculty has active relationships with 800 external corporate partners. In addition to the kinds of initiatives noted by the department, the Engineering Research Office will be well positioned to help connect students with potential data collection opportunities in the business world.

- e) **Integrate library skills** (citations and bibliographic tools, search, etc.) into the curriculum in the form of workshops, labs, etc., following the tailored, scaffolded approach used in the MBET program.

Program Response

During the first term of the student's Ph.D. program, we will host a citation and bibliography workshop through the University of Waterloo's writing and communication center (included on page 25 of the proposal).

2. **RECRUITMENT & EVALUATION**

- a) Approach the question of **recruitment strategy and demand analysis** with the same rigour that might apply to a larger program.

Program Response

We appreciate the reviewers' concern that it can be difficult to recruit high quality applicants, and especially high quality domestic applicants, to doctoral programs in Canada. It is our belief that a significant investment in a "demand analysis" is not merited, and it is not clear how this would be effectively done. We have anecdotal reason to believe that even our own programs will generate some worthy applicants; two of our recent MBET students are doing PhDs at U. of Toronto and were clear they would have done them with us if we had had a program. A third recent MBET student continues to watch our progress on this. A fourth has recently applied to Calgary. Given that we are targeting a small intake of PhD students, we feel confident we will have enough of a pool of strong applicants. Moreover, the risk that we would not have enough good applicants does not represent much material risk to the university, given the nature of our proposal. If that were the case, we simply would not take students or run the program. This is a luxury we enjoy given that course offerings are planned as "overload" teaching and no faculty lines are supported by the proposed program.

However, we are clearly highly motivated to see the program succeed, and for that reason the reviewers' other comment here is highly worthwhile: we need a rigorous approach to recruitment strategy. We will utilize our own alumni base and broader networks to spread news of the program. We will capitalize on the popularity of our professors to encourage interest among strong UW undergraduates. Faculty will tap into their broad professional networks. And we are fortunate to have our own marketing team, which can deploy social media strategies to get the word out. The uniqueness of our program (one of the only "Entrepreneurship" PhD programs in the country), the Waterloo brand, and the unique opportunity to study our ecosystem all leave us confident we can generate the interest required to recruit two to three very good students a year.

Dean's Response

Conrad School of Entrepreneurship and Business being part of the Faculty of Engineering makes our Faculty unique, and we consider it to be one of our key strengths. We are committed to ensuring the continued growth and success of the School's new PhD program.

- b) **Add RA experience as a desired qualification** for admission.

Program Response

We have included explicitly that applicants should highlight any prior research or research assistantship experience in their applications (see page 6).

- c) Clarify the specific **GPA and GRE/GMAT requirements**.

Program Response

We do mention a minimum overall average of 75% or equivalent in the previous degree. Regarding specific GRE/GMAT requirements, most schools do not post specific GMAT/GRE scores in their admission criteria. Some schools may post their average GMAT/GRE scores for the last three years' incoming class. We do not think it's necessary to include these specific scores at this stage of our program. However, we think presenting historical data, once available, is appropriate and desirable.

Deans Response

The other departments in Engineering have similar minimum GPA requirement.

- d) Create a structure for **evaluating students' ability to conduct independent research** as early as possible, and prior to the dissertation proposal process.

Program Response

As we mentioned in our response to 1b above, the students will write independent research/term papers in their core courses. In addition, we have slightly modified our comprehensive exam format allowing us to clearly evaluate the student's ability to conduct independent research earlier in the program. In the comprehensive exam, the examination committee, consisting of faculty members that have taught the core courses, will assign three research questions to the students. The students will select one of these questions or suggest a slightly modified version of one of the questions. In all cases the question(s) must serve to require the substantive breadth covering different courses. The students will write a research study that will address this question. The research study will include relevant background information, literature review, hypotheses, discussion of potential methods to test the hypotheses, a description of how results will be interpreted, and a discussion of possible problems in implementing the method and how those problems could be addressed. The students will submit the written study 10-14 days before the oral examination with the comprehension examination committee. We have elaborated our comprehensive exam format on page 12 of the proposal.

Dean's Response

Please refer to the response to recommendation 1b.

3. **SUPPORT & EXIT**

- a) **Set stipendary, research, and tuition equalization support levels based on a full comparative analysis** of doctoral programs in entrepreneurship to ensure competitive recruitment.

Program Response

The revised faculty of engineering Ph.D. support is now \$25,000/year. However, this amount does not include a teaching assistantship. Along with a teaching assistantship, Ph.D. students will earn around \$32,000/year. Based on our interaction with Ph.D. students in other programs, this seems a highly competitive amount (also see funding amount at [Ivey](#) and [Haskayne](#), both of which offer specialization in Entrepreneurship).

Dean's Response

Successful applicants for Conrad's PhD program will be automatically screened for the Doctoral Engineering Excellence Fellowship (EEF-D). Also, the Faculty of Engineering is currently exploring ways to increasing the finding level of our PhD students.

- b) Create an **'offramp' for students** who have successfully completed the coursework requirements, in the case of misfit with the program, misalignment in career aspirations, or deficiencies in meeting degree level expectations (e.g., for the comprehensive exam).

Program Response

This is a good suggestion. There are two possible offramps, one existing currently, and two in discussion. The first is the Conrad School's Graduate Diploma in Entrepreneurship and Business. It requires six approved courses or equivalents. Students who complete their course work would be eligible for this credential. The Conrad School will further investigate possible transfers to the MMASc and MMSc degrees offered by the Department of Management Sciences. It is also possible that the Conrad School may offer its own research-based masters program in the future.

Dean's Response

Rigorous screening of the applications at the admissions stage can help minimize such occurrences as we see in our other doctoral programs.

FOR THE FACULTY:

4. **Commit to the 1-2 new hires specified** in the proposal as a minimum to sustain the program beyond its launch and **conduct a comparison of doctoral FTE per supervising faculty member at comparator institutions** to determine the long-term staffing required.

Program Response

Since we plan a smaller intake of Ph.D. students, we feel comfortable launching the program with our current faculty. We have seven faculty members who have research grants and are qualified to supervise students. However, we are scheduled to hire at least five new faculty members over the next three years. We are confident that once the program reaches full capacity (five years from now), with approximately 10 students at various stages of completion, we will have more than enough supervisory capacity. Further, students will only be admitted when supervisory capacity is available and appropriate faculty are willing to take on new students.

Dean's Response

Engineering will continue to support new faculty hires in the Conrad School as per existing commitments.

5. Develop a process for **strengthening the school's capacity for doctoral supervision** through training, mentorship, co-supervision, formal processes, or informal communities of practice.

Program Response

We will organize mentoring sessions by inviting outside faculty with significant doctoral supervisory experience. We can start these sessions in Fall 2022 by inviting UW faculty, especially from the departments of Psychology and Economics, who have supervised Ph.D. students for a considerable time. Further, it is anticipated that at least two of the new faculty hires in the coming three years will be mid-career scholars with doctoral supervision experience. Indeed, their supervision success will be a criterion for their selection.

Dean's Response

New faculty members can participate in a workshop series on graduate supervision offered by the Office of the Associate Vice-President, Graduate Studies and Postdoctoral Affairs (GSPA). This can help the faculty member achieve the Approved Doctoral Dissertation Supervisor (ADDS) status.

FOR THE PROGRAM:

6. Perform a **structured review of the academic job market in entrepreneurship** to determine if a 4-year program is sufficient.

Program Response

We looked at the Academy of Management job site (the most important job portal for faculty openings in management) for current openings in Entrepreneurship and other important management disciplines. We found that there are currently 164 advertised faculty openings in Entrepreneurship and Innovation, while there are 111 positions in Strategy, 99 in Organizational Behavior, and 113 in Human Resource Management. This shows that there are substantially more openings in Entrepreneurship than in other major management disciplines. Also, since we had looked at these numbers last year (reported in the proposal), the number of openings in Entrepreneurship has increased by 6.5 percent. We have updated this information in our proposal on page 3.

In terms of hosting a 4-year Ph.D. program, we looked at other Ph.D. programs offering Entrepreneurship as a specialization, and these programs also commit to 4-year funding for their students (see [Ivey](#) and [Haskayne](#)). There is a definite move among Ph.D. programs to graduate students towards the end of their fourth year.

It is not uncommon for doctoral students in four-year programs to require a fifth year to complete their programs, or to position themselves for success in the job market. There are also some doctoral programs in Canada (e.g., Schulich and Rotman) that offer five years of guaranteed support, but they are in the minority. Expanding program offerings under development at the Conrad School heighten the likelihood that combinations of research support, TA'ships, targeted scholarships from existing resources, and sessional teaching could support such program extensions for some students.

Dean's Response

I support the Program's response and have no further comment

7. Place the **study of entrepreneurship at the centre of each proposed course**, reflecting the underlying integrative approach to the program.

Program Response

As we indicate in our proposal, our program will apply an entrepreneurial lens, therefore, in courses such as Organizational Behaviour and Business Strategy, while the instructors will cover important theories in these fields, they will also specifically discuss how these

theories are currently applied in the entrepreneurial space. Similarly, in the Research Methods course, the instructor will cover important research method techniques in entrepreneurship literature.

Dean's Response

I support the Program's response and have no further comment

8. Design program structures and practices that **reduce the school's vulnerability to faculty turnover** if it does occur.

Program Response

We have made provisions for co-supervisory teams, where a student can be jointly supervised by two Conrad faculty members. In addition, each Thesis Committee will have at least two additional faculty members from Conrad (other than the Supervisor). These faculty members will be involved with the students from the start of their thesis proposal. Both these provisions reduce any adverse effect on students in the event of a faculty turnover.

Dean's Response

I support the Program's response and have no further comment

9. Consider the **risks associated with courses outside the department** (i.e., the dependence on outside faculties) and mitigate those risks (e.g., MOUs establishing guaranteed seats for Conrad PhD students in these courses).

Program Response

We have spoken directly to the Ph.D. program directors at other departments (Economics, Psychology, Sociology, and Management Science), and they have all agreed to allow our students to take graduate method courses in their departments. Also, since we will have a small intake of students, accommodating our students in graduate courses in these departments will not be a problem. We will pursue written confirmation of these commitments.

Dean's Response

I support the Program's response and have no further comment

10. **Establish goals for the classroom environment** given the small (2-3) cohort size and

monitor against faculty and student experiences.

Program Response

Doctoral seminar courses will be intimate, to be certain, but we see that as a strength. Indeed, one of the richest learning environments in post-secondary education – The Oxford tutorial – is directed reading, discussion and engagement between a faculty member and 2-3 students. Even if there is an addition of 2-3 students from other disciplines or departments, this will make for extremely high-quality, high-expectation learning environments. The Associate Director, doctoral studies and research, will be responsible to be in regular contact with teachers, students, and faculty advisors, to continuously monitor the quality of the experience for all involved.

Dean's Response

I support the Program's response and have no further comment

11. Focus the proposal's strategic justification on a **singular and clear strategic motivation, aligned with Waterloo's overall mission and strategy**, i.e., the program will increase the school's research intensity, assist faculty in advancing their research programs, and position the school as a centre for thought leadership in entrepreneurship.

Program Response

We appreciate this excellent suggestion – it aligns with our motivation. We have included this in our proposal (page 3).

Dean's Response

I support the Program's response and have no further comment

12. A more **focused program name** might be beneficial (e.g., PhD in Entrepreneurship).

Program Response

We understand the appeal of the more focused name. Our chosen name – PhD in Entrepreneurship and Organizations – captures the greater breadth of faculty's interests and expertise, and may help graduates position themselves not only for "entrepreneurship" jobs, but also for those in fields like Strategy, or departments of "Management and Organizations" which have become the norm among top tier business schools. The inclusion of "Organizations" is a signal of the kind of theoretical frameworks to which students are likely to be exposed and in which they will have expertise.

Dean's Response

I support the Program's response and have no further comment

Recommendations Not Selected for Implementation

We have provided our rationale for recommendations that we did not select in our responses above.



Signature of Approval

Chair/Director

Sept-20/22

Date

Mary Wells

Digitally signed by
Mary Wells
Date: 2022.09.20
14:09:51 -04'00'

Dean's

Date



Graduate Studies Program Revision Template

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

Faculty: Mathematics

Program: 1) Master of Mathematics (MMath) in Pure Mathematics
2) Master of Mathematics (MMath) in Pure Mathematics - Quantum Information

Program contact name(s): Barbara Csima

Form completed by: Barbara Csima

Description of proposed changes:

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

- 1) *Removing the part-time option from the programs.*
- 2) *Identifying the process for students to enter the thesis study option.*

Is this a [major modification](#) to the program? Yes

Rationale for change(s):

- 1) *The programs are structured for full-time study. We have not been admitting students to part-time, so listing it as an option is inaccurate. The possibility for full-time students to change to part-time as part of an accommodation could still be evaluated/approved on a case-by-case basis.*
- 2) *For most students the Research Paper option is the best fit, so we are currently only admitting students to the Research Paper option, allowing a transfer to the Thesis Option only after a strong first term and a willing Supervisor. The thesis study option is intended for students who have already taken many graduate courses as an undergraduate, and are ready for a larger research component. We now would like the process stated in the calendar.*

Proposed effective date: Term: Winter Year: 2023

Current [Graduate Studies Academic Calendar \(GSAC\)](#) page (include the link to the web page where the changes are to be made):

<https://uwaterloo.ca/graduate-studies-academic-calendar/mathematics/department-pure-mathematics/master-mathematics-mmath-pure-mathematics>

<https://uwaterloo.ca/graduate-studies-academic-calendar/mathematics/department-pure-mathematics/master-mathematics-mmath-pure-mathematics-quantum-information>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
Program information	Program information

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall ○ Winter • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Program type <ul style="list-style-type: none"> ○ Master's ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis ○ Master's Research Paper <p>Degree requirements</p>	<ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall ○ Winter • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Program type <ul style="list-style-type: none"> ○ Master's ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis ○ Master's Research Paper <p>Degree requirements</p> <p><u>All students are admitted to the Master's Research Paper study option. Students can apply to transfer to the Thesis study option after completing at least one academic term. The transfer must be approved by the Department Graduate Officer.</u></p>

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

- 1) *No impact*
- 2) *No impact*

Department/School approval date (12/14/21):

Reviewed by GSPA (for GSPA use only) date (03/03/22):

Faculty approval date (mm/dd/yy): 09/20/22

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

Senate approval date (mm/dd/yy) (if applicable):

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

Faculty: Mathematics

Program: 1) Doctor of Philosophy (PhD) in Pure Mathematics
2) Doctor of Philosophy (PhD) in Pure Mathematics - Quantum Information

Program contact name(s): Barbara Csima

Form completed by: Barbara Csima

Description of proposed changes:

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

- 1) *Removing the part-time option from the programs.*
- 2) *Removing the personal statement from the list of minimum admission requirements.*

Is this a [major modification](#) to the program? Yes

Rationale for change(s):

- 1) *The programs are structured for full-time study. We have not been admitting students to part-time, so listing it as an option is inaccurate. The possibility for full-time students to change to part-time as part of an accommodation could still be evaluated/approved on a case-by-case basis.*
- 2) *We no longer require a personal statement. We are instead asking for a research proposal or summary of recently completed project, but this is part of the supplemental information form.*

Proposed effective date: Term: Winter Year: 2023

Current [Graduate Studies Academic Calendar \(GSAC\)](#) page (include the link to the web page where the changes are to be made):

<https://uwaterloo.ca/graduate-studies-academic-calendar/mathematics/department-pure-mathematics/doctor-philosophy-phd-pure-mathematics>

<https://uwaterloo.ca/graduate-studies-academic-calendar/mathematics/department-pure-mathematics/doctor-philosophy-phd-pure-mathematics-quantum-information>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall ○ Winter 	<p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall ○ Winter

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> ○ Spring • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Program type <ul style="list-style-type: none"> ○ Doctoral ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ A Master's degree (or equivalent) in Mathematics with at least a 78% standing. Exceptions may be made for students with an Honours Bachelor degree who demonstrate a very high level of background preparation and research potential. ○ A one-page personal statement. • Application materials <ul style="list-style-type: none"> ○ Supplementary information form ○ Transcript(s) • References <ul style="list-style-type: none"> ○ Number of references: 3 ○ Type of references: at least 2 academic • English language proficiency (ELP) (if applicable) 	<ul style="list-style-type: none"> ○ Spring • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Program type <ul style="list-style-type: none"> ○ Doctoral ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ A Master's degree (or equivalent) in Mathematics with at least a 78% standing. Exceptions may be made for students with an Honours Bachelor degree who demonstrate a very high level of background preparation and research potential. • Application materials <ul style="list-style-type: none"> ○ Supplementary information form ○ Transcript(s) • References <ul style="list-style-type: none"> ○ Number of references: 3 ○ Type of references: at least 2 academic • English language proficiency (ELP) (if applicable)

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

- 1) *No impact*
- 2) *No impact*

Department/School approval date (12/14/21):

Reviewed by GSPA (for GSPA use only) date (mm/dd/yy): 03/03/22

Faculty approval date (mm/dd/yy): 09/20/22

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 [content revision instructions](#) and information regarding [major/minor modifications](#). For questions about the form submission, contact [Trevor Clews](#), Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Mathematics

Program: Doctor of Philosophy (PhD) in Combinatorics and Optimization

Program contact name(s): Karen Yeats

Form completed by: Karen Yeats

Description of proposed changes:

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

- 1) *Adding a transfer entry internship option to the PhD in Combinatorics and Optimization program, in addition to keeping the regular existing PhD program.
Note: Other than the internship requirement and the fact that this not a direct-entry program, the PhD in Combinatorics and Optimization - Internship program option is identical to the PhD in Combinatorics and Optimization program. The program name that appears on diplomas and transcripts will be identical for both options.*
- 2) *Revising the length of program information.*

Is this a [major modification](#) to the program? Yes

Rationale for change(s):

- 1) *By enrolling in this new PhD program option with a required internship, international students will be able to obtain a work permit to do an internship and work full-time hours at the internship in any term, subject to the conditions stated in the motion.*
- 2) *The length of program information did not follow current practice. Both maximum and minimums are specified elsewhere in the Calendar. Parallel changes to the regular PhD programs are underway.*

Proposed effective date: Term: Winter Year: 2023

Current [Graduate Studies Academic Calendar \(GSAC\)](#) page (include the link to the web page where the changes are to be made):

<https://uwaterloo.ca/graduate-studies-academic-calendar/mathematics/department-combinatorics-and-optimization>

Current PhD in Combinatorics and Optimization Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Internship Graduate Studies Academic Calendar content:

<p>Current PhD in Combinatorics and Optimization Graduate Studies Academic Calendar content:</p>	<p>Proposed PhD in Combinatorics and Optimization - Internship Graduate Studies Academic Calendar content:</p>
<p>DOCTOR OF PHILOSOPHY (PHD) IN COMBINATORICS AND OPTIMIZATION</p> <p>Graduate research fields</p> <ul style="list-style-type: none"> • Algebraic Combinatorics • Continuous Optimization • Cryptography • Discrete Optimization • Graph Theory • Quantum Computing <p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall ○ Winter ○ Spring • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Length of program <ul style="list-style-type: none"> ○ The normal period of registration for the PhD degree is 6 terms from a Master's degree. One year of credit may be granted by the Faculty Graduate Committee for work done towards the PhD degree at another institution, provided that the relevance of the previous work to the student's proposed program is clearly established. • Program type <ul style="list-style-type: none"> ○ Doctoral ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ A Master's degree in combinatorics and optimization, or in a closely related field, with a minimum 89% average in Master's level coursework. 	<p>DOCTOR OF PHILOSOPHY (PHD) IN COMBINATORICS AND OPTIMIZATION - INTERNSHIP</p> <p>Graduate research fields</p> <ul style="list-style-type: none"> • Algebraic Combinatorics • Continuous Optimization • Cryptography • Discrete Optimization • Graph Theory • Quantum Computing <p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall ○ Winter ○ Spring • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Length of program <ul style="list-style-type: none"> ○ <u>Students are required to complete the program in accordance with the University program time limits.</u> • Program type <ul style="list-style-type: none"> ○ Doctoral ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ <u>Students in the Doctor of Philosophy (PhD) in Combinatorics and Optimization program can apply to transfer into the Doctor of Philosophy (PhD) in Combinatorics and Optimization - Internship program option after completing at least one academic term. Admittance will be decided based on the student's</u>

Current PhD in Combinatorics and Optimization Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Internship Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> ○ Completion of a master's thesis. ○ It is essential that the application for admission into the PhD program contains evidence of research ability or potential. ○ Students in the PhD program are regarded as being on probation during their first year in the Department, and their performance during this first year determines whether they are allowed to continue in the program. In particular, failure in any one course, or an unsatisfactory performance in the comprehensive examination, automatically results in a review of the student's progress by the Department Graduate Committee. PhD students' progress will be reviewed at least once per year. ○ A student who is enrolled in the Master of Mathematics (MMath) program in the Department of Combinatorics and Optimization and wishes to continue in the PhD program has to apply for admission into the program. In exceptional cases, a graduate student enrolled in a MMath (Thesis) program in the Department of Combinatorics and Optimization may, through the Graduate Officer and with the consent of the Supervisor, petition the Graduate Committee to be transferred into a PhD program. The guidelines for such a transfer are as follows: <ul style="list-style-type: none"> ▪ The student has been enrolled in the MMath (Thesis) program for at least two terms. ▪ The student has made considerable progress in the research project (of the type that would warrant the MMath degree) and is committed to carrying the project to completion in a PhD program. ▪ The student gives a seminar presentation of the work carried out so far, and answers related questions to the satisfaction of an examining committee consisting of the supervisor and two other faculty members. 	<p><u>progress to date, and is subject to approval by the student's supervisor(s) and the Associate Chair, Graduate Studies in the Department of Combinatorics and Optimization.</u></p> <p>Degree requirements Thesis option:</p> <ul style="list-style-type: none"> • Graduate Academic Integrity Module (Graduate AIM) • Courses <ul style="list-style-type: none"> ○ Students must complete 8 courses, including 4 core courses and at least 1 other CO course. The remaining 3 courses must be graduate courses in the Faculty of Mathematics, or courses approved by the CO Graduate Committee. ○ At least 6 courses should normally be completed within the first 6 terms. ○ Core courses: <ul style="list-style-type: none"> ▪ CO 630 Algebraic Enumeration ▪ CO 642 Graph Theory ▪ CO 650 Combinatorial Optimization ▪ CO 663 Convex Optimization and Analysis ▪ CO 681 Quantum Information Processing ▪ CO 685 The Mathematics of Public-Key Cryptography ○ If students have credit for a course deemed equivalent to a particular core course by the Department Graduate Committee, then that part of the core requirement may be waived. ○ The Department may require additional coursework in cases where this is judged to be necessary; for instance, when a student is admitted to the PhD program without having been granted credit for a Master's degree. • <u>PhD Internship</u> <ul style="list-style-type: none"> ○ <u>Students are required to complete one or more 3-4 month internships working on a topic related to their program. The internships will normally be arranged by the student, possibly with assistance from the supervisor. The internship</u>

Current PhD in Combinatorics and Optimization Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Internship Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> ○ Students applying to the PhD program who hold a Master's degree from another university may, in some cases, be admitted initially into the MMath program. In such cases the Graduate Committee will decide, within three terms, whether to transfer the student into the PhD program. <ul style="list-style-type: none"> • Application materials <ul style="list-style-type: none"> ○ Supplementary information form ○ Transcript(s) • References <ul style="list-style-type: none"> ○ Number of references: 3 ○ Type of references: normally from academic sources. • English language proficiency (ELP) (if applicable) <p>Degree requirements Thesis option:</p> <ul style="list-style-type: none"> • Graduate Academic Integrity Module (Graduate AIM) • Courses <ul style="list-style-type: none"> ○ Students must complete 8 courses, including 4 core courses and at least 1 other CO course. The remaining 3 courses must be graduate courses in the Faculty of Mathematics, or courses approved by the CO Graduate Committee. ○ At least 6 courses should normally be completed within the first 6 terms. ○ Core courses: <ul style="list-style-type: none"> ▪ CO 630 Algebraic Enumeration ▪ CO 642 Graph Theory ▪ CO 650 Combinatorial Optimization ▪ CO 663 Convex Optimization and Analysis ▪ CO 681 Quantum Information Processing ▪ CO 685 The Mathematics of Public-Key Cryptography ○ If students have credit for a course deemed equivalent to a particular core course by the Department Graduate 	<p><u>must be approved by the supervisor and the Associate Chair, Graduate Studies in the Department of Combinatorics and Optimization. At most two consecutive terms can be taken for an internship. An internship may not be taken in the student's final term.</u></p> <ul style="list-style-type: none"> • Graduate Studies Research Skills Seminar <ul style="list-style-type: none"> ○ Required for PhD students unless the student satisfied this requirement as a MMath student at the Department of Combinatorics and Optimization. • PhD Lecturing Requirement <ul style="list-style-type: none"> ○ Every PhD student will be required to lecture under supervision during the program of studies. If a PhD student gives a scheduled course on a regular basis, the same two faculty members will attend three of the lectures and make a confidential, constructive critique of the student's performance to the student. ○ The PhD Lecturing Requirement should normally be completed within the first eight terms of the student's PhD program. Students may not put their thesis on display until at least the term following that in which the Lecturing Requirement was successfully completed. • PhD Comprehensive Examination <ul style="list-style-type: none"> ○ This requirement consists of 2 written examinations covering the fundamentals of combinatorics and optimization. These are usually offered once a year, in the spring term. The student must write one exam from two of the following three categories: <ul style="list-style-type: none"> ▪ Combinatorial Enumeration, Graph Theory ▪ Continuous Optimization, Discrete Optimization ▪ Cryptography, Quantum Computing ○ The choice of exams is made by the student, in consultation with their supervisor. The exams must be taken

Current PhD in Combinatorics and Optimization Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Internship Graduate Studies Academic Calendar content:
<p>Committee, then that part of the core requirement may be waived.</p> <ul style="list-style-type: none"> ○ The Department may require additional coursework in cases where this is judged to be necessary; for instance, when a student is admitted to the PhD program without having been granted credit for a Master's degree. <ul style="list-style-type: none"> ● Graduate Studies Research Skills Seminar <ul style="list-style-type: none"> ○ Required for PhD students unless the student satisfied this requirement as a MMath student at the Department of Combinatorics and Optimization. ● PhD Lecturing Requirement <ul style="list-style-type: none"> ○ Every PhD student will be required to lecture under supervision during the program of studies. If a PhD student gives a scheduled course on a regular basis, the same two faculty members will attend three of the lectures and make a confidential, constructive critique of the student's performance to the student. ○ The PhD Lecturing Requirement should normally be completed within the first eight terms of the student's PhD program. Students may not put their thesis on display until at least the term following that in which the Lecturing Requirement was successfully completed. ● PhD Comprehensive Examination <ul style="list-style-type: none"> ○ This requirement consists of 2 written examinations covering the fundamentals of combinatorics and optimization. These are usually offered once a year, in the spring term. The student must write one exam from two of the following three categories: <ul style="list-style-type: none"> ▪ Combinatorial Enumeration, Graph Theory ▪ Continuous Optimization, Discrete Optimization ▪ Cryptography, Quantum Computing ○ The choice of exams is made by the student, in consultation with their supervisor. The exams must be taken 	<p>within the first four terms of the student's PhD program.</p> <ul style="list-style-type: none"> ○ The PhD Comprehensive Examination requirement is satisfied by passing both examinations. <ul style="list-style-type: none"> ● PhD Thesis Proposal <ul style="list-style-type: none"> ○ The PhD Thesis Proposal is an oral exam at which the student is expected to give a brief description of the questions they propose to work on for the PhD and a summary of the main results in this area. This exam should normally be taken within the first six terms of the student's PhD program. The student should provide a short written version of their thesis proposal to their committee one week before the oral presentation. The PhD Thesis Proposal requirement is satisfied by successful completion of this exam. ○ Advisory Committee: each student has an Advisory Committee, which normally consists of the student's supervisor and two other department members with expertise in the area of the student's research interests. The Advisory Committee acts as the examining committee at the student's PhD Thesis Proposal, and is usually formed at this time. The members of the advisory committee will also usually act as examiners at the student's PhD defence. The Advisory Committee is selected by the Graduate Officer, who will consult the student and their supervisor. ● PhD Thesis <ul style="list-style-type: none"> ○ Students must prepare a thesis, embodying the results of original research, of a standard that would warrant publication in a research journal of the field. The thesis must be acceptable to the student's supervisor, to two professors in the Department and one professor outside the Department, and to an external examiner familiar with the student's research field. The student is required to defend the thesis at an oral examination. This requirement is met

Current PhD in Combinatorics and Optimization Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Internship Graduate Studies Academic Calendar content:
<p>within the first four terms of the student's PhD program.</p> <ul style="list-style-type: none"> ○ The PhD Comprehensive Examination requirement is satisfied by passing both examinations. <ul style="list-style-type: none"> ● PhD Thesis Proposal <ul style="list-style-type: none"> ○ The PhD Thesis Proposal is an oral exam at which the student is expected to give a brief description of the questions they propose to work on for the PhD and a summary of the main results in this area. This exam should normally be taken within the first six terms of the student's PhD program. The student should provide a short written version of their thesis proposal to their committee one week before the oral presentation. The PhD Thesis Proposal requirement is satisfied by successful completion of this exam. ○ Advisory Committee: each student has an Advisory Committee, which normally consists of the student's supervisor and two other department members with expertise in the area of the student's research interests. The Advisory Committee acts as the examining committee at the student's PhD Thesis Proposal, and is usually formed at this time. The members of the advisory committee will also usually act as examiners at the student's PhD defence. The Advisory Committee is selected by the Graduate Officer, who will consult the student and their supervisor. ● PhD Thesis <ul style="list-style-type: none"> ○ Students must prepare a thesis, embodying the results of original research, of a standard that would warrant publication in a research journal of the field. The thesis must be acceptable to the student's supervisor, to two professors in the Department and one professor outside the Department, and to an external examiner familiar with the student's research field. The student is required to defend the thesis at an oral examination. This requirement is met 	<p>when the thesis has been successfully defended and accepted.</p>

Current PhD in Combinatorics and Optimization Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Internship Graduate Studies Academic Calendar content:
when the thesis has been successfully defended and accepted.	

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

This is a new, non-direct-entry program option that is being created, so there are no students currently registered in this program. Once created, students registered in the Doctor of Philosophy (PhD) in Combinatorics and Optimization program can transfer to this program option in order to avail of internship opportunities. Other than the internship requirement and the fact that this not a direct-entry program, the PhD in Combinatorics and Optimization – Internship program option is identical to the PhD in Combinatorics and Optimization program.

- Department/School approval date** (mm/dd/yy): 03/07/22
- Reviewed by GSPA** (for GSPA use only) **date** (mm/dd/yy): 01/25/22
- Faculty approval date** (mm/dd/yy): 09/20/22
- Senate Graduate & Research Council (SGRC) approval date** (mm/dd/yy):
- Senate approval date** (mm/dd/yy) (if applicable):

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

Faculty: Mathematics

Program: Doctor of Philosophy (PhD) in Combinatorics and Optimization - Quantum Information

Program contact name(s): Karen Yeats

Form completed by: Karen Yeats

Description of proposed changes:

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

- 1) *Adding a transfer entry internship option to the PhD in Combinatorics and Optimization - Quantum Information program, in addition to keeping the regular existing PhD program.
Note: Other than the internship requirement and the fact that this not a direct-entry program, the PhD in Combinatorics and Optimization - Quantum Information - Internship program option is identical to the PhD in Combinatorics and Optimization - Quantum Information program. The program name that appears on diplomas and transcripts will be identical for both options.*
- 2) *Revising the length of program information.*

Is this a [major modification](#) to the program? Yes

Rationale for change(s):

- 1) *By enrolling in this new PhD program option with a required internship, international students will be able to obtain a work permit to do an internship and work full-time hours at the internship in any term, subject to the conditions stated in the motion.*
- 2) *The length of program information did not follow current practice. Both maximum and minimums are specified elsewhere in the Calendar. Parallel changes to the regular PhD programs are underway.*

Proposed effective date: Term: Winter Year: 2023

Current [Graduate Studies Academic Calendar \(GSAC\)](#) page (include the link to the web page where the changes are to be made):

<https://uwaterloo.ca/graduate-studies-academic-calendar/mathematics/department-combinatorics-and-optimization>

Current PhD in Combinatorics and Optimization - Quantum Information Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Quantum Information - Internship Graduate Studies Academic Calendar content:

<p>Current PhD in Combinatorics and Optimization - Quantum Information Graduate Studies Academic Calendar content:</p>	<p>Proposed PhD in Combinatorics and Optimization - Quantum Information - Internship Graduate Studies Academic Calendar content:</p>
<p>DOCTOR OF PHILOSOPHY (PHD) IN COMBINATORICS AND OPTIMIZATION - QUANTUM INFORMATION</p> <p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall ○ Winter ○ Spring • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Length of program <ul style="list-style-type: none"> ○ The normal period of registration for the PhD degree is 6 terms from a Master's degree. One year of credit may be granted by the Faculty Graduate Committee for work done towards the PhD degree at another institution, provided that the relevance of the previous work to the student's proposed program is clearly established. • Program type <ul style="list-style-type: none"> ○ Collaborative ○ Doctoral ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ A Master's degree in combinatorics and optimization, or in a closely related field, with a minimum 89% average in Master's level coursework. ○ Completion of a master's thesis. ○ It is essential that the application for admission into the PhD program contains evidence of research ability or potential. ○ Students in the PhD program are regarded as being on probation during 	<p>DOCTOR OF PHILOSOPHY (PHD) IN COMBINATORICS AND OPTIMIZATION - QUANTUM INFORMATION - <u>INTERNSHIP</u></p> <p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall ○ Winter ○ Spring • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Length of program <ul style="list-style-type: none"> ○ <u>Students are required to complete the program in accordance with the University program time limits.</u> • Program type <ul style="list-style-type: none"> ○ Collaborative ○ Doctoral ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ <u>Students in the Doctor of Philosophy (PhD) in Combinatorics and Optimization - Quantum Information program can apply to transfer into the Doctor of Philosophy (PhD) in Combinatorics and Optimization - Quantum Information - Internship program option after completing at least one academic term. Admittance will be decided based on the student's progress to date, and is subject to approval by the student's supervisor(s) and the Associate Chair, Graduate Studies in the Department of Combinatorics and Optimization.</u> <p>Degree requirements</p>

Current PhD in Combinatorics and Optimization - Quantum Information Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Quantum Information - Internship Graduate Studies Academic Calendar content:
<p>their first year in the Department, and their performance during this first year determines whether they are allowed to continue in the program. In particular, failure in any one course, or an unsatisfactory performance in the comprehensive examination, automatically results in a review of the student's progress by the Department Graduate Committee. PhD students' progress will be reviewed at least once per year.</p> <ul style="list-style-type: none"> ○ A student who is enrolled in the Master of Mathematics (MMath) program in the Department of Combinatorics and Optimization and wishes to continue in the PhD program has to apply for admission into the program. In exceptional cases, a graduate student enrolled in a MMath (Thesis) program in the Department of Combinatorics and Optimization may, through the Graduate Officer and with the consent of the Supervisor, petition the Graduate Committee to be transferred into a PhD program. The guidelines for such a transfer are as follows: <ul style="list-style-type: none"> ▪ The student has been enrolled in the MMath (Thesis) program for at least two terms. ▪ The student has made considerable progress in the research project (of the type that would warrant the MMath degree) and is committed to carrying the project to completion in a PhD program. ▪ The student gives a seminar presentation of the work carried out so far, and answers related questions to the satisfaction of an examining committee consisting of the supervisor and two other faculty members. ○ Students applying to the PhD program who hold a Master's degree from another university may, in some cases, be admitted initially into the MMath program. In such cases the Graduate Committee will decide, within three terms, whether to transfer the student 	<p>Thesis option:</p> <ul style="list-style-type: none"> • Graduate Academic Integrity Module (Graduate AIM) • Courses <ul style="list-style-type: none"> ○ Students must complete 8 courses, including the 2 Quantum Information core courses, and 3 other CO core courses. At least 5 of the courses taken should be CO courses and at least 4 should be QI courses (note that jointly offered or cross-listed courses, like CO681/QIC710, are regarded as both CO and QIC courses). The remaining course (if any) must be a graduate course in the Faculty of Mathematics, or a course approved by the CO Graduate Committee. ○ At least 6 courses should normally be completed within the first 6 terms. ○ Combinatorics and Optimization core courses: <ul style="list-style-type: none"> ▪ CO 630 Algebraic Enumeration ▪ CO 642 Graph Theory ▪ CO 650 Combinatorial Optimization ▪ CO 663 Convex Optimization and Analysis ▪ CO 681 Quantum Information Processing ▪ CO 685 The Mathematics of Public-Key Cryptography ○ Quantum Information core courses: <ul style="list-style-type: none"> ▪ QIC 710 Quantum Information Processing (equivalent to CO 681 Quantum Information Processing) ▪ QIC 750 Quantum Information Processing Devices ○ If students have credit for a course deemed equivalent to a particular core course by the Department Graduate Committee, then that part of the core requirement may be waived. ○ The Department may require additional coursework in cases where this is judged to be necessary; for instance, when a student is admitted to the PhD program without having been granted credit for a Master's degree.

Current PhD in Combinatorics and Optimization - Quantum Information Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Quantum Information - Internship Graduate Studies Academic Calendar content:
<p>into the PhD program.</p> <ul style="list-style-type: none"> • Application materials <ul style="list-style-type: none"> ○ Supplementary information form ○ Transcript(s) • References <ul style="list-style-type: none"> ○ Number of references: 3 ○ Type of references: normally from academic sources. • English language proficiency (ELP) (if applicable) <p>Degree requirements Thesis option:</p> <ul style="list-style-type: none"> • Graduate Academic Integrity Module (Graduate AIM) • Courses <ul style="list-style-type: none"> ○ Students must complete 8 courses, including the 2 Quantum Information core courses, and 3 other CO core courses. At least 5 of the courses taken should be CO courses and at least 4 should be QI courses (note that jointly offered or cross-listed courses, like CO681/QIC710, are regarded as both CO and QIC courses). The remaining course (if any) must be a graduate course in the Faculty of Mathematics, or a course approved by the CO Graduate Committee. ○ At least 6 courses should normally be completed within the first 6 terms. ○ Combinatorics and Optimization core courses: <ul style="list-style-type: none"> ▪ CO 630 Algebraic Enumeration ▪ CO 642 Graph Theory ▪ CO 650 Combinatorial Optimization ▪ CO 663 Convex Optimization and Analysis ▪ CO 681 Quantum Information Processing ▪ CO 685 The Mathematics of Public-Key Cryptography ○ Quantum Information core courses: <ul style="list-style-type: none"> ▪ QIC 710 Quantum Information Processing (equivalent to CO 	<ul style="list-style-type: none"> • PhD Internship <ul style="list-style-type: none"> ○ <u>Students are required to complete one or more 3-4 month internships working on a topic related to their program. The internships will normally be arranged by the student, possibly with assistance from the supervisor. The internship must be approved by the supervisor and the Associate Chair, Graduate Studies in the Department of Combinatorics and Optimization. At most two consecutive terms can be taken for an internship. An internship may not be taken in the student's final term.</u> • Graduate Studies Research Skills Seminar <ul style="list-style-type: none"> ○ Required for PhD students unless the student satisfied this requirement as a MMath student at the Department of Combinatorics and Optimization. • PhD Quantum Information Seminar <ul style="list-style-type: none"> ○ Students must successfully complete a seminar milestone consisting of 1 Institute for Quantum Computing (IQC) seminar, and 1 seminar on a Quantum Information (QI) topic. If appropriate, lectures given as part of the Lecturing Requirement may also be used to satisfy the seminar requirement. • PhD Lecturing Requirement <ul style="list-style-type: none"> ○ Every PhD student will be required to lecture under supervision during the program of studies. If a PhD student gives a scheduled course on a regular basis, the same two faculty members will attend three of the lectures and make a confidential, constructive critique of the student's performance to the student. ○ The PhD Lecturing Requirement should normally be completed within the first eight terms of the student's PhD program. Students may not put their thesis on display until at least the term following that in which the Lecturing Requirement was successfully completed. • PhD Comprehensive Examination

Current PhD in Combinatorics and Optimization - Quantum Information Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Quantum Information - Internship Graduate Studies Academic Calendar content:
<p>681 Quantum Information Processing)</p> <ul style="list-style-type: none"> ▪ QIC 750 Implementation of Quantum Information Processing <ul style="list-style-type: none"> ○ If students have credit for a course deemed equivalent to a particular core course by the Department Graduate Committee, then that part of the core requirement may be waived. ○ The Department may require additional coursework in cases where this is judged to be necessary; for instance, when a student is admitted to the PhD program without having been granted credit for a Master's degree. <ul style="list-style-type: none"> • Graduate Studies Research Skills Seminar <ul style="list-style-type: none"> ○ Required for PhD students unless the student satisfied this requirement as a MMath student at the Department of Combinatorics and Optimization. • PhD Quantum Information Seminar <ul style="list-style-type: none"> ○ Students must successfully complete a seminar milestone consisting of 1 Institute for Quantum Computing (IQC) seminar, and 1 seminar on a Quantum Information (QI) topic. If appropriate, lectures given as part of the Lecturing Requirement may also be used to satisfy the seminar requirement. • PhD Lecturing Requirement <ul style="list-style-type: none"> ○ Every PhD student will be required to lecture under supervision during the program of studies. If a PhD student gives a scheduled course on a regular basis, the same two faculty members will attend three of the lectures and make a confidential, constructive critique of the student's performance to the student. ○ The PhD Lecturing Requirement should normally be completed within the first eight terms of the student's PhD program. Students may not put their thesis on display until at least the term following that in which the Lecturing Requirement was successfully completed. 	<ul style="list-style-type: none"> ○ This requirement consists of 2 written examinations covering the fundamentals of combinatorics and optimization. These are usually offered once a year, in the Spring term. The student must write one exam from two of the following three categories: <ul style="list-style-type: none"> ▪ Combinatorial Enumeration, Graph Theory ▪ Continuous Optimization, Discrete Optimization ▪ Cryptography, Quantum Computing ○ The choice of exams is made by the student, in consultation with their supervisor. The exams must be taken within the first four terms of the student's PhD program. ○ The PhD Comprehensive Examination requirement is satisfied by passing both examinations. <ul style="list-style-type: none"> • PhD Thesis Proposal <ul style="list-style-type: none"> ○ The PhD Thesis Proposal is an oral exam at which the student is expected to give a brief description of the questions they propose to work on for the PhD and a summary of the main results in this area. This exam should normally be taken within the first six terms of the student's PhD program. The student should provide a short written version of their thesis proposal to their committee one week before the oral presentation. The PhD Thesis Proposal requirement is satisfied by successful completion of this exam. ○ Advisory Committee: each student has an Advisory Committee, which normally consists of the student's supervisor and two other department members with expertise in the area of the student's research interests. The Advisory Committee acts as the examining committee at the student's PhD Thesis Proposal, and is usually formed at this time. The members of the advisory committee will also usually act as examiners at the student's PhD defence. The Advisory Committee is selected by the Graduate Officer, who will consult the student and their

Current PhD in Combinatorics and Optimization - Quantum Information Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Quantum Information - Internship Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> • PhD Comprehensive Examination <ul style="list-style-type: none"> ○ This requirement consists of 2 written examinations covering the fundamentals of combinatorics and optimization. These are usually offered once a year, in the Spring term. The student must write one exam from two of the following three categories: <ul style="list-style-type: none"> ▪ Combinatorial Enumeration, Graph Theory ▪ Continuous Optimization, Discrete Optimization ▪ Cryptography, Quantum Computing ○ The choice of exams is made by the student, in consultation with their supervisor. The exams must be taken within the first four terms of the student's PhD program. ○ The PhD Comprehensive Examination requirement is satisfied by passing both examinations. • PhD Thesis Proposal <ul style="list-style-type: none"> ○ The PhD Thesis Proposal is an oral exam at which the student is expected to give a brief description of the questions they propose to work on for the PhD and a summary of the main results in this area. This exam should normally be taken within the first six terms of the student's PhD program. The student should provide a short written version of their thesis proposal to their committee one week before the oral presentation. The PhD Thesis Proposal requirement is satisfied by successful completion of this exam. ○ Advisory Committee: each student has an Advisory Committee, which normally consists of the student's supervisor and two other department members with expertise in the area of the student's research interests. The Advisory Committee acts as the examining committee at the student's PhD Thesis Proposal, and is usually formed at this time. The members of the advisory committee will also usually act as examiners at the student's PhD defence. The Advisory Committee is selected by the Graduate Officer, who 	<p>supervisor.</p> <ul style="list-style-type: none"> • PhD Thesis <ul style="list-style-type: none"> ○ Students must prepare a thesis in Quantum Information, embodying the results of original research, of a standard that would warrant publication in a research journal of the field. The thesis must be acceptable to the student's supervisor, to two professors in the Department and one professor outside the Department, and to an external examiner familiar with the student's research field. The student is required to defend the thesis at an oral examination. This requirement is met when the thesis has been successfully defended and accepted.

Current PhD in Combinatorics and Optimization - Quantum Information Graduate Studies Academic Calendar content:	Proposed PhD in Combinatorics and Optimization - Quantum Information - Internship Graduate Studies Academic Calendar content:
<p>will consult the student and their supervisor.</p> <ul style="list-style-type: none"> • PhD Thesis <ul style="list-style-type: none"> ○ Students must prepare a thesis in Quantum Information, embodying the results of original research, of a standard that would warrant publication in a research journal of the field. The thesis must be acceptable to the student's supervisor, to two professors in the Department and one professor outside the Department, and to an external examiner familiar with the student's research field. The student is required to defend the thesis at an oral examination. This requirement is met when the thesis has been successfully defended and accepted. 	

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

This is a new, non-direct-entry program option that is being created, so there are no students currently registered in this program. Once created, students registered in the Doctor of Philosophy (PhD) in Combinatorics and Optimization - Quantum Information program can transfer to this program option in order to avail of internship opportunities. Other than the internship requirement and the fact that this not a direct-entry program, the PhD in Combinatorics and Optimization - Quantum Information - Internship program option is identical to the PhD in Combinatorics and Optimization - Quantum Information program.

Department/School approval date (mm/dd/yy): 03/07/22

Reviewed by GSPA (for GSPA use only) date (mm/dd/yy): 01/25/22

Faculty approval date (mm/dd/yy): 09/20/22

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 [content revision instructions](#) and information regarding [major/minor modifications](#). For questions about the form submission, contact [Trevor Clews](#), Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Mathematics

Program: Master of Mathematics (MMath) in Data Science

Program contact name(s): Mu Zhu, Silvana Shamuon, Ryan McGuinness

Form completed by: Mu Zhu

Description of proposed changes:

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

Adding a Master's Research Paper study option to the MMath in Data Science program.

Is this a [major modification](#) to the program? Yes

Rationale for change(s):

We are adding a Master's Research Paper option to the program to be consistent with other MMath programs within the Faculty.

Proposed effective date: Term: Winter Year: 2023

Current [Graduate Studies Academic Calendar \(GSAC\)](#) page (include the link to the web page where the changes are to be made):

<https://uwaterloo.ca/graduate-studies-academic-calendar/mathematics/data-science/master-mathematics-mmath-data-science>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Length of program <ul style="list-style-type: none"> ○ 4 to 6 terms • Program type <ul style="list-style-type: none"> ○ Master's ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time 	<p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Length of program <ul style="list-style-type: none"> ○ 4 to 6 terms • Program type <ul style="list-style-type: none"> ○ Master's ○ Research • Registration option(s) <ul style="list-style-type: none"> ○ Full-time

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ A four-year Honours Bachelor's degree or equivalent in data science, computer science, statistics, mathematics or a related field, with a minimum overall average of 78%. ○ Experience at the senior level in computer science or statistics. • Application materials <ul style="list-style-type: none"> ○ Résumé/Curriculum Vitae ○ Supplementary information form ○ Transcript(s) • References <ul style="list-style-type: none"> ○ Number of references: 3 ○ Type of references: at least 2 academic • English language proficiency (ELP) (if applicable) <p>Degree requirements</p> <p>Thesis option:</p> <ul style="list-style-type: none"> • Graduate Academic Integrity Module (Graduate AIM) • Courses <ul style="list-style-type: none"> ○ Students must complete at least 4 courses. Students lacking adequate background in computer science may be required to take CS 600 Fundamentals of Computer Science for Data Science, and students lacking adequate background in statistics may be required to take STAT 845 Statistical Concepts for Data Science. Neither of these courses may be counted toward the 4 course requirement. The 4 courses must normally include: <ul style="list-style-type: none"> ▪ 1. STAT 847 Exploratory Data Analysis ▪ 2. Exactly 1 of: <ul style="list-style-type: none"> ▪ CS 631 Data-Intensive Distributed Analytics, or ▪ CS 651 Data-Intensive Distributed Computing 	<ul style="list-style-type: none"> ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Thesis ○ <u>Master's Research Paper</u> <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ A four-year Honours Bachelor's degree or equivalent in data science, computer science, statistics, mathematics or a related field, with a minimum overall average of 78%. ○ Experience at the senior level in computer science or statistics. • Application materials <ul style="list-style-type: none"> ○ Résumé/Curriculum Vitae ○ Supplementary information form ○ Transcript(s) • References <ul style="list-style-type: none"> ○ Number of references: 3 ○ Type of references: at least 2 academic • English language proficiency (ELP) (if applicable) <p>Degree requirements</p> <p><u>All students are admitted to the Thesis study option. Students can transfer to the Master's Research Paper study option with approval from their thesis supervisor and the Graduate Director.</u></p> <p>Thesis option:</p> <ul style="list-style-type: none"> • Graduate Academic Integrity Module (Graduate AIM) • Courses <ul style="list-style-type: none"> ○ Students must complete at least 4 courses. Students lacking adequate background in computer science may be required to take CS 600 Fundamentals of Computer Science for Data Science, and students lacking adequate background in statistics may be required to take STAT 845 Statistical Concepts for Data Science. Neither of these courses may be counted toward the 4 course requirement. The 4 courses must normally include: <ul style="list-style-type: none"> ▪ 1. STAT 847 Exploratory Data Analysis

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> ▪ 3. At least 1 of: <ul style="list-style-type: none"> ▪ CS 680 Introduction to Machine Learning ▪ CS 685 Machine Learning: Statistical and Computational Foundations ▪ CS 686 Introduction to Artificial Intelligence ▪ CS 795 / CO 602 / CM 740 Fundamentals of Optimization ▪ CS 794 / CO 673 Optimization for Data Science ▪ CO 650 Combinatorial Optimization ▪ CO 663 Convex Optimization and Analysis ▪ CS 786 Probabilistic Inference and Machine Learning ▪ CS 886 Advanced Topics in Artificial intelligence ▪ STAT 840 / CM 761 Computational Inference ▪ STAT 841 / CM 763 Statistical Learning - Classification ▪ STAT 844 / CM 764 Statistical Learning - Advanced Regression ▪ STAT 946 Topics in Probability and Statistics(*) ▪ 4. The fourth course is normally chosen from the following list: ▪ Machine learning / statistical learning / optimization <ul style="list-style-type: none"> ▪ CS 680 Introduction to Machine Learning ▪ CS 685 Machine Learning: Statistical and Computational Foundations ▪ CS 686 Introduction to Artificial Intelligence ▪ CS 795 / CO 602 / CM 740 Fundamentals of Optimization 	<ul style="list-style-type: none"> ▪ 2. Exactly 1 of: <ul style="list-style-type: none"> ▪ CS 631 Data-Intensive Distributed Analytics, or ▪ CS 651 Data-Intensive Distributed Computing ▪ 3. At least 1 of: <ul style="list-style-type: none"> ▪ CS 680 Introduction to Machine Learning ▪ CS 685 Machine Learning: Statistical and Computational Foundations ▪ CS 686 Introduction to Artificial Intelligence ▪ CS 795 / CO 602 / CM 740 Fundamentals of Optimization ▪ CS 794 / CO 673 Optimization for Data Science ▪ CO 650 Combinatorial Optimization ▪ CO 663 Convex Optimization and Analysis ▪ CS 786 Probabilistic Inference and Machine Learning ▪ CS 886 Advanced Topics in Artificial intelligence ▪ STAT 840 / CM 761 Computational Inference ▪ STAT 841 / CM 763 Statistical Learning - Classification ▪ STAT 844 / CM 764 Statistical Learning - Advanced Regression ▪ STAT 946 Topics in Probability and Statistics(*) ▪ 4. The fourth course is normally chosen from the following list: ▪ Machine learning / statistical learning / optimization <ul style="list-style-type: none"> ▪ CS 680 Introduction to Machine Learning ▪ CS 685 Machine Learning: Statistical and Computational Foundations

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> ▪ CS 794 / CO 673 Optimization for Data Science ▪ CO 650 Combinatorial Optimization ▪ CO 663 Convex Optimization and Analysis ▪ CO 769 Topics in Continuous Optimization(*) ▪ CS 786 Probabilistic Inference and Machine Learning ▪ CS 885 Advanced Topics in Computational Statistics(*) ▪ CS 886 Advanced Topics in Artificial intelligence ▪ STAT 840 / CM 761 Computational Inference ▪ STAT 841 / CM 763 Statistical Learning - Classification ▪ STAT 844 / CM 764 Statistical Learning - Advanced Regression ▪ STAT 946 Topics in Probability and Statistics(*) ▪ Computer systems and databases <ul style="list-style-type: none"> ▪ CS 638 Principles of Database Management and Use ▪ CS 648 Database Systems Implementation ▪ CS 656 Computer Networks ▪ CS 657 System Performance Evaluation ▪ CS 658 Computer Security and Privacy ▪ CS 740 Database Engineering ▪ CS 741 Non-Traditional Databases ▪ CS 742 Parallel and Distributed Database Systems 	<ul style="list-style-type: none"> ▪ CS 686 Introduction to Artificial Intelligence ▪ CS 795 / CO 602 / CM 740 Fundamentals of Optimization ▪ CS 794 / CO 673 Optimization for Data Science ▪ CO 650 Combinatorial Optimization ▪ CO 663 Convex Optimization and Analysis ▪ CO 769 Topics in Continuous Optimization(*) ▪ CS 786 Probabilistic Inference and Machine Learning ▪ CS 885 Advanced Topics in Computational Statistics(*) ▪ CS 886 Advanced Topics in Artificial intelligence ▪ STAT 840 / CM 761 Computational Inference ▪ STAT 841 / CM 763 Statistical Learning - Classification ▪ STAT 844 / CM 764 Statistical Learning - Advanced Regression ▪ STAT 946 Topics in Probability and Statistics(*) ▪ Computer systems and databases <ul style="list-style-type: none"> ▪ CS 638 Principles of Database Management and Use ▪ CS 648 Database Systems Implementation ▪ CS 656 Computer Networks ▪ CS 657 System Performance Evaluation ▪ CS 658 Computer Security and Privacy ▪ CS 740 Database Engineering ▪ CS 741 Non-Traditional Databases

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> ▪ CS 743 Principles of Database Management and Use ▪ CS 755 Systems and Network Architectures and Implementation ▪ CS 848 Advanced Topics in Databases(*) ▪ Distributed computing <ul style="list-style-type: none"> ▪ CS 654 Distributed Systems ▪ CS 856 Advanced Topics in Distributed Computing(*) ▪ Data exploration <ul style="list-style-type: none"> ▪ STAT 842 / CM 762 Data Visualization ▪ Other <ul style="list-style-type: none"> ▪ CS 798 Advanced Research Topics(*) ▪ At the discretion of the Data Science Committee, substitutions may be allowed. ▪ (*) Note: CO 769, CS 798, CS courses at the 800 level, and STAT courses at the 900 level should be on a topic in Data Science; they are subject to the approval of the Graduate Director. <ul style="list-style-type: none"> • Ethics Workshop <ul style="list-style-type: none"> ○ Students must complete a 3-day workshop on “Ethics in Data Science and Artificial Intelligence” that will be offered in the Fall term. Alternatively, students can complete the course CS 798 Advanced Research Topics on “Artificial Intelligence: Law, Ethics, and Policy”. • Master’s Thesis <ul style="list-style-type: none"> ○ Students must complete a thesis containing original work under the supervision of a faculty member. The thesis Examining Committee consists of the thesis supervisor and two additional readers. The supervisor and first reader should be members of the Data Science program; the second reader may be any regular faculty member of the University. The student must make an oral presentation on the thesis before Examining Committee members following the regulations for 	<ul style="list-style-type: none"> ▪ CS 742 Parallel and Distributed Database Systems ▪ CS 743 Principles of Database Management and Use ▪ CS 755 Systems and Network Architectures and Implementation ▪ CS 848 Advanced Topics in Databases(*) ▪ Distributed computing <ul style="list-style-type: none"> ▪ CS 654 Distributed Systems ▪ CS 856 Advanced Topics in Distributed Computing(*) ▪ Data exploration <ul style="list-style-type: none"> ▪ STAT 842 / CM 762 Data Visualization ▪ Other <ul style="list-style-type: none"> ▪ CS 798 Advanced Research Topics(*) ▪ At the discretion of the Data Science Committee, substitutions may be allowed. ▪ (*) Note: CO 769, CS 798, CS courses at the 800 level, and STAT courses at the 900 level should be on a topic in Data Science; they are subject to the approval of the Graduate Director. <ul style="list-style-type: none"> • Ethics Workshop <ul style="list-style-type: none"> ○ Students must complete a 3-day workshop on “Ethics in Data Science and Artificial Intelligence” that will be offered in the Fall term. Alternatively, students can complete the course CS 798 Advanced Research Topics on “Artificial Intelligence: Law, Ethics, and Policy”. • Master’s Thesis <ul style="list-style-type: none"> ○ Students must complete a thesis containing original work under the supervision of a faculty member. The thesis Examining Committee consists of the thesis supervisor and two additional readers. The supervisor and first reader should be members of the Data Science program; the second reader may be any regular faculty member of the University. The student

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<p>the MMath degree by the Faculty of Mathematics. Committee members should receive a copy of the thesis at least two weeks prior to presentation.</p>	<p>must make an oral presentation on the thesis before Examining Committee members following the regulations for the MMath degree by the Faculty of Mathematics. Committee members should receive a copy of the thesis at least two weeks prior to presentation.</p> <p><u>Master’s Research paper option:</u></p> <ul style="list-style-type: none"> • <u>Graduate Academic Integrity Module (Graduate AIM)</u> • <u>Courses</u> <ul style="list-style-type: none"> ○ <u>Students must complete at least 6 courses. Students lacking adequate background in computer science may be required to take CS 600 Fundamentals of Computer Science for Data Science, and students lacking adequate background in statistics may be required to take STAT 845 Statistical Concepts for Data Science. Neither of these courses may be counted toward the 6 course requirement. The 6 courses must normally include:</u> <ul style="list-style-type: none"> ▪ <u>1. STAT 847 Exploratory Data Analysis</u> ▪ <u>2. Exactly 1 of:</u> <ul style="list-style-type: none"> ▪ <u>CS 631 Data-Intensive Distributed Analytics, or</u> ▪ <u>CS 651 Data-Intensive Distributed Computing</u> ▪ <u>3. At least 1 of:</u> <ul style="list-style-type: none"> ▪ <u>CS 680 Introduction to Machine Learning</u> ▪ <u>CS 685 Machine Learning: Statistical and Computational Foundations</u> ▪ <u>CS 686 Introduction to Artificial Intelligence</u> ▪ <u>CS 795 / CO 602 / CM 740 Fundamentals of Optimization</u> ▪ <u>CS 794 / CO 673 Optimization for Data Science</u> ▪ <u>CO 650 Combinatorial Optimization</u> ▪ <u>CO 663 Convex Optimization and Analysis</u>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	<ul style="list-style-type: none"> ▪ <u>CS 786 Probabilistic Inference and Machine Learning</u> ▪ <u>CS 886 Advanced Topics in Artificial intelligence</u> ▪ <u>STAT 840 / CM 761 Computational Inference</u> ▪ <u>STAT 841 / CM 763 Statistical Learning - Classification</u> ▪ <u>STAT 844 / CM 764 Statistical Learning - Advanced Regression</u> ▪ <u>STAT 946 Topics in Probability and Statistics(*)</u> ▪ <u>4. The 3 additional courses are normally chosen from the following list:</u> ▪ <u>Machine learning / statistical learning / optimization</u> <ul style="list-style-type: none"> ▪ <u>CS 680 Introduction to Machine Learning</u> ▪ <u>CS 685 Machine Learning: Statistical and Computational Foundations</u> ▪ <u>CS 686 Introduction to Artificial Intelligence</u> ▪ <u>CS 795 / CO 602 / CM 740 Fundamentals of Optimization</u> ▪ <u>CS 794 / CO 673 Optimization for Data Science</u> ▪ <u>CO 650 Combinatorial Optimization</u> ▪ <u>CO 663 Convex Optimization and Analysis</u> ▪ <u>CO 769 Topics in Continuous Optimization(*)</u> ▪ <u>CS 786 Probabilistic Inference and Machine Learning</u> ▪ <u>CS 885 Advanced Topics in Computational Statistics(*)</u> ▪ <u>CS 886 Advanced Topics in Artificial intelligence</u>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	<ul style="list-style-type: none"> ▪ <u>STAT 840 / CM 761 Computational Inference</u> ▪ <u>STAT 841 / CM 763 Statistical Learning - Classification</u> ▪ <u>STAT 844 / CM 764 Statistical Learning - Advanced Regression</u> ▪ <u>STAT 946 Topics in Probability and Statistics(*)</u> ▪ <u>Computer systems and databases</u> <ul style="list-style-type: none"> ▪ <u>CS 638 Principles of Database Management and Use</u> ▪ <u>CS 648 Database Systems Implementation</u> ▪ <u>CS 656 Computer Networks</u> ▪ <u>CS 657 System Performance Evaluation</u> ▪ <u>CS 658 Computer Security and Privacy</u> ▪ <u>CS 740 Database Engineering</u> ▪ <u>CS 741 Non-Traditional Databases</u> ▪ <u>CS 742 Parallel and Distributed Database Systems</u> ▪ <u>CS 743 Principles of Database Management and Use</u> ▪ <u>CS 755 Systems and Network Architectures and Implementation</u> ▪ <u>CS 848 Advanced Topics in Databases(*)</u> ▪ <u>Distributed computing</u> <ul style="list-style-type: none"> ▪ <u>CS 654 Distributed Systems</u> ▪ <u>CS 856 Advanced Topics in Distributed Computing(*)</u> ▪ <u>Data exploration</u> <ul style="list-style-type: none"> ▪ <u>STAT 842 / CM 762 Data Visualization</u> ▪ <u>Other</u> <ul style="list-style-type: none"> ▪ <u>CS 798 Advanced Research Topics(*)</u>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	<ul style="list-style-type: none"> ▪ <u>At the discretion of the Data Science Committee, substitutions may be allowed.</u> ▪ <u>(*) Note: CO 769, CS 798, CS courses at the 800 level, and STAT courses at the 900 level should be on a topic in Data Science; they are subject to the approval of the Graduate Director.</u> • <u>Ethics Workshop</u> <ul style="list-style-type: none"> ○ <u>Students must complete a 3-day workshop on “Ethics in Data Science and Artificial Intelligence” that will be offered in the Fall term. Alternatively, students can complete the course CS 798 Advanced Research Topics on “Artificial Intelligence: Law, Ethics, and Policy”.</u> • <u>Master’s Research Paper</u> <ul style="list-style-type: none"> ○ <u>Students must complete a research paper under the supervision of a faculty member. The supervisor plus one additional regular faculty member of the University must assess and approve the paper. Students must also present their research paper topic in a publicly announced seminar.</u>

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

The new option will become available to all currently registered students immediately after these changes take effect.

Department/School approval date (mm/dd/yy): 07/13/22 CS; 07/22/22 S&AS; 07/26/22 C&O

Reviewed by GSPA (for GSPA use only) date (mm/dd/yy): 07/28/22

Faculty approval date (mm/dd/yy): 09/20/22

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

Senate approval date (mm/dd/yy) (if applicable):

University of Waterloo
SENATE UNDERGRADUATE COUNCIL
Report to Senate
21 November 2022

Senate Undergraduate Council met on 4 October 2022 and agreed, in accordance with [Senate Bylaw 2](#) (section 5.03) to forward the following items to Senate for approval in the regular agenda.

Further details are available at: uwaterloo.ca/secretariat/committees-and-councils/senate-undergraduate-council

FOR APPROVAL

ACADEMIC PLAN CHANGES

Faculty of Engineering
Biomedical Engineering

1. **Motion:** That Senate approve the following proposed Biomaterials and Tissues Specialization, Medical Artificial Intelligence Specialization, and Medical Devices Specialization, effective 1 September 2023.

Background and Rationale: New specializations are introduced in Biomaterials and Tissues, Medical Artificial Intelligence, and Medical Devices to help students develop greater depth in a particular area of biomedical engineering. There is strong interest from students in this group of specializations. (Units offering non-Engineering courses included in these specializations were consulted.

Proposed calendar text:

..... **Specializations**

Students may choose to take their technical electives from a more restricted list to receive the Biomaterials and Tissues Specialization, the Medical Artificial Intelligence Specialization, the Medical Devices Specialization, the Neural Engineering Specialization, or the Sports Engineering Specialization.

Note: It is the student's responsibility to ensure that their course selection meets the Biomedical Engineering requirements as well as the CEAB requirements, which include a minimum number of instruction hours in the various CEAB categories.

Biomaterials and Tissues Specialization

The specialization consists of five courses, one required course and four elective courses. A minimum average of 60% in the five specialization courses and a grade of at least 50% in each of the courses is required. Students who satisfy the requirements for [Faculty Options, Specializations and Electives for Engineering Students](#) will have the appropriate designation shown on their diploma and transcript.

Required course:

- [BME 589](#) Special Topics in Biomedical Devices [Topic title: Biomaterials and Biomedical Design]

Two courses from the following list (biomaterial science and tissue mechanics):

- [BME 499](#) Elective Biomedical Research Project (requires approval from the co-ordinator of the Biomaterials and Tissues Specialization)
- [BME 588](#) Special Topics in Biomechanics [Topic title: Introductory Mechanics of Biomedical and Biological Materials]
- [BME 588](#) Special Topics in Biomechanics [Topic title: Computational Biomechanics]
- [BME 589](#) Special Topics in Biomedical Devices (requires approval from the co-ordinator of the Biomaterials and Tissues Specialization)
- [NE 481](#) Introduction to Nanomedicine and Nanobiotechnology

One course from the following list (material engineering):

- [CHE 541](#) Introduction to Polymer Science and Properties
- [ME 526](#) Fatigue and Fracture Analysis
- [ME 533](#) Non-metallic and Composite Materials
- [ME 559](#) Finite Element Methods
- [ME 598](#) Special Topics in Mechanical Engineering [Topic title: Smart Materials and Active Structures]
- [SYDE 599](#) Special Topics in Systems Design Engineering [Topic title: Material Selection for Design]

One course from the following list (biology and physiology):

- [BIOL 240](#) Fundamentals of Microbiology
- [BIOL 302](#) Functional Histology
- [BIOL 308](#) Principles of Molecular Biology
- [BIOL 355](#) Biology of Human Aging
- [BIOL 373](#) Principles of Human Physiology 2
- [BIOL 376](#) Cellular Neurophysiology
- [KIN 406](#) Physiology of Muscle Aging and Disease

Medical Artificial Intelligence Specialization

The Medical Artificial Intelligence Specialization consists of five courses, three required courses and two elective courses. Students are also required to do either their capstone design project ([BME 461](#) or [GENE 403](#) or [SYDE 461](#) and [BME 462](#) or [GENE 404](#) or [SYDE 462](#)) or an elective research project ([BME 499](#)) with a focus on the use of artificial intelligence in healthcare. The project must be approved by the co-ordinator of the specialization. A minimum average of 60% in the specialization courses and a grade of at least 50% in each of the courses is required. Students who satisfy the requirements for Faculty Options, Specializations and Electives for Engineering Students will have the appropriate designation shown on their diploma and transcript.

Required courses:

- [BME 530](#) The Healthcare System
- [SYDE 572](#) Introduction to Pattern Recognition
- [SYDE 599](#) Special Topics in Systems Design Engineering [Topic title: Deep Learning]

One of the following, a capstone project or research project with a focus on medical artificial intelligence

and approved by the specialization co-ordinator:

- [BME 461](#) Biomedical Engineering Design Workshop 2 and [BME 462](#) Biomedical Engineering Design Workshop 3, or
- [BME 499](#) Elective Biomedical Research Project, or
- [GENE 403](#) Interdisciplinary Design Project 1 and [GENE 404](#) Interdisciplinary Design Project 2, or
- [SYDE 461](#) Systems Design Capstone Project 1 and [SYDE 462](#) Systems Design Capstone Project 2

List 1: One course that provides a survey of artificial intelligence methods from the following list:

- [CS 486](#) Introduction to Artificial Intelligence
- [ECE 457B](#) Fundamentals of Computational Intelligence
- [SYDE 522](#) Foundations of Artificial intelligence

List 2: One additional course from the following list:

- [BME 499](#) Elective Biomedical Research Project (requires approval from the co-ordinator of the Medical Artificial Intelligence Specialization)
- [CS 485](#) Statistical and Computational Foundations of Machine Learning
- [ECE 457C](#) Reinforcement Learning
- [HLTH 230](#) Introduction to Health Informatics
- [MSCI 446](#) Introduction to Machine Learning
- [STV 208](#) Artificial Intelligence and Society: Impact, Ethics, and Equity
- [SYDE 552](#) Computational Neuroscience
- [SYDE 556](#) Simulating Neurobiological Systems

Alternatively, students can take zero courses from List 1 and two courses from List 2.

Medical Devices Specialization

The Medical Devices specialization consists of five technical elective courses. Students are also required to do either their capstone design project ([BME 461](#) or [GENE 403](#) or [SYDE 461](#) and [BME 462](#) or [GENE 404](#) or [SYDE 462](#)) or an elective research project ([BME 499](#)) with a focus on medical devices. The project must be approved by the specialization co-ordinator. A minimum average of 60% in the five specialization courses and a grade of at least 50% in each of the courses is required. Students who satisfy the requirements for [Faculty Options, Specializations and Electives for Engineering Students](#) will have the appropriate designation shown on their diploma and transcript.

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

- [BME 461](#) Biomedical Engineering Design Workshop 2 and [BME 462](#) Biomedical Engineering Design Workshop 3, or
- [BME 499](#) Elective Biomedical Research Project, or
- [GENE 403](#) Interdisciplinary Design Project 1 and [GENE 404](#) Interdisciplinary Design Project 2, or
- [SYDE 461](#) Systems Design Capstone Project 1 and [SYDE 462](#) Systems Design Capstone Project 2

One course from the following list (biocompatibility or clinical assessment of medical devices):

- [BME 540](#) Fundamentals in Neural and Rehabilitation Engineering
- [BME 589](#) Special Topics in Biomedical Devices [Topic title: Biomaterials and Biomedical Design]
- [BME 589](#) Special Topics in Biomedical Devices (biocompatibility topic approved by the specialization co-ordinator)

Two courses from the following list (elements of biomedical devices):

- [BME 589](#) Special Topics in Biomedical Devices [Topic title: Biomedical Engineering Electronic Circuits]
- [ME 598](#) Special Topics in Mechanical Engineering [Topic title: Smart Materials and Active Structures]
- [MTE 545](#) Introduction to MEMS Fabrication
- [NE 466](#) Tactile Sensors and Transducers
- [NE 486](#) Biosensors
- [NE 487](#) Microfluidic and Nanobiotechnological Systems

Two additional courses from either list above or among the following additional courses:

- [BME 588](#) Special Topics in Biomechanics [Topic title: Introductory Mechanics of Biomedical and Biological Materials]
- [SYDE 599](#) Special Topics in Systems Design Engineering [Topic title: Material Selection for Design]

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Faculty of Engineering Civil Engineering

2. **Motion:** That Senate approve the following proposed Building Science Specialization, effective 1 September 2023.

Background and Rationale: Addition of new specialization (Building Science Specialization). Many Civil Engineering students have expressed interest in Building Science courses.

Proposed calendar text:

..... Specializations

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

Each specialization requires students to select TEs with a common theme. Students are responsible for meeting the TE requirements of the Civil Engineering plan when pursuing a specialization. Each

specialization requires the successful completion of a minimum number of TEs specified by the specialization with a minimum average of 60%. Students must declare a specialization for it to be recognized as part of their degree and appear on the transcript and diploma.

The specialization course requirements are provided below.

Building Science Specialization

The Building Science Specialization requires a minimum of four TEs from the lists below.

- From TE List 1:
 - [AE 405](#) Building Performance Measurement Lab
 - [AE 450](#) Building Service Systems
 - [AE 572](#) Building Energy Analysis
 - [AE 573](#) HVAC Systems, Equipment, and Energy Efficiency
 - [ME 452](#) HVAC Load Analysis and Design Fundamentals
- From TE List 2:
 - [CIVE 507](#) Building Science and Technology
 - [ENVE 277](#) Air Quality Engineering
 - [ENVE 279](#) Energy and the Environment

Bachelor of Sustainability and Financial Management

3. **Motion:** That Senate approve the following changes to the Bachelor of Sustainability and Financial Management, effective 1 September 2023.

Background and Rationale: The Indigenous Entrepreneurship Diploma and Minor already offered by the Faculty of Arts is being integrated into the BSFM to provide an alternative pathway of study to meet the specialization requirement of the program. This change expands the instructional focus of the program more fully on Indigenous opportunities in business and increases the accessibility of the BSFM for students with non-traditional education pathways who commence studies at Waterloo in the Indigenous Entrepreneurship Diploma. Adding this specialization builds on the Indigenous Entrepreneurship Minor and complements the other two specializations in the program. Students cannot combine the Indigenous Entrepreneurship Specialization with the Indigenous Entrepreneurship Diploma or the Indigenous Entrepreneurship Minor.

The specialization will draw on existing courses, primarily INDENT, and provides students with flexibility by way of three electives. ERS 275 addresses Indigenous sustainable entrepreneurship directly and provides an opportunity for understanding business and economic development concepts through Indigenous knowledge systems, including exposure to Indigenous business leaders and business models. This course replaces ERS 372, which focuses on Indigenous environmental knowledge, but with limited business and entrepreneurship content. ENVS 401, Indigenous Peoples, Canadian Law and Natural Resource Development, provides the constitutional foundations of Aboriginal and treaty rights under s.35 of the Constitution Act, and addresses the obligations the Crown and resource developers owe Indigenous groups in relation to land and resource development. Understanding the unique legal position of Canada's Indigenous groups is central to the business and development practices that are at the core of the specialization. St. Paul's University College has been consulted and approves the inclusion of these courses.

Current calendar text: <https://ugradcalendar.uwaterloo.ca/page/ARTS-BSFM-Degree-Requirements>

Proposed calendar text: (bold and underline = new, strikethrough = deletion)

Eligibility for the degree of Bachelor of Sustainability and Financial Management (Co-op) requires:

1. Successful completion of 20 academic course units with a minimum cumulative overall average of 60%. A minimum cumulative average of 70% is required in all of the courses identified in sections (2) and (3), and all Accounting and Financial Management (AFM), Sustainability and Financial Management (SFM), Environment and Business (ENBUS), and Environment (ENVS) electives.
2. Successful completion of the following 12.5 academic course units:
 - o AFM 112, AFM 113, AFM 121, AFM 182, AFM 191, AFM 205 (0.25 unit), AFM 208 (0.25 unit), AFM 244, AFM 273, AFM 274, AFM 291, AFM 373, AFM 391
 - o SFM 101, SFM 102, SFM 201, SFM 301, SFM 309
 - o ENBUS 202
 - o ENVS 200, ENVS 201, ENVS 205
 - o GEOG 207
 - o AFM 433 or ENBUS 302
 - o AFM 111, ENVS 131 (see Note 1)
3. Successful completion of one of the ~~two~~**three** 6.0 academic unit specializations.
4. Successful completion of co-op requirements.

Notes

1. Communication skills are essential to academic, professional, and personal success. The Undergraduate Communication Requirement is fulfilled for Bachelor of Sustainability and Financial Management (BSFM) students by the successful completion of both AFM 111 and ENVS 131.
2. Students are required to complete courses in first and second year in the following sequence: 1A Term: AFM 111, AFM 112, AFM 191, ENVS 205, SFM 101
1B Term: AFM 113, AFM 121, AFM 182, ENVS 131, SFM 102
2A Term: AFM 205, AFM 208, AFM 273, ENBUS 202, ENVS 200, GEOG 207
2B Term: AFM 244, AFM 274, AFM 291, ENVS 201, SFM 201
Students who are required to repeat a course or who can't follow this sequence due to transfer credits are required to follow a course sequence approved by the academic advisor.

...

Indigenous Entrepreneurship Specialization

- **ENVS 401, ERS 275 (Topic: Indigenous Sustainability Entrepreneurship), INDENT 200, INDENT 210, INDENT 225, INDENT 310, INDENT 325**
- **Two of HIST 269, HIST 271, INDG 201/CDNST 201, INDG 272/ ANTH 272, INDG 301, INDG 318/RS 318**
- **1.5 academic units AFM, ENBUS, ENVS, INDENT, SFM courses at the 300-level or above**

Course List

ENVS 401 – Canadian Law, Indigenous Peoples, and Natural Resource Development

ERS 275 – Special Readings/Seminar on Select Topics (Topic: Indigenous Sustainability Entrepreneurship)
HIST 269 – Indigenous Histories in Canada
HIST 271 – Global Indigenous Issues
INDENT 200 – The Past, Present, and Future of Indigenous Entrepreneurship
INDENT 210 – Fundamentals of Indigenous Entrepreneurship
INDENT 225 – Practicum in Indigenous Entrepreneurship 1
INDENT 310 – Case Studies in Indigenous Venture Creation
INDENT 325 – Practicum in Indigenous Entrepreneurship 2
INDG 201/CDNST 201 – The Indigenous Experience in Canada
INDG 272/ANTH 272 – Issues in Contemporary Indigenous Communities in Canada
INDG 301 – Critical Theories of Indigeneity in a Global Perspective
INDG 318/RS 318 – Indigenous Worldviews and Spirituality

/twk

David DeVidi
Associate Vice-President, Academic

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University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
and
SENATE UNDERGRADUATE COUNCIL
Report to Senate
21 November 2022

Senate Graduate & Research Council (SGRC) met on 3 October 2022 and Senate Undergraduate Council (SUC) met on 4 October 2022 and agreed, in accordance with [Senate Bylaw 2](#) (section 4.03, 5.03), to forward the following items to Senate for approval as part of the regular agenda.

Further details are available at:

<https://uwaterloo.ca/secretariat/committees-and-councils/senate-undergraduate-council>

<https://uwaterloo.ca/secretariat/committees-and-councils/senate-graduate-research-council>

FOR APPROVAL ([Senate Bylaw 2](#); sections 4.03(a), 5.03(a))

ACADEMIC CALENDAR DATES 2023-2024

1. **Motion:** To approve the 2023-2024 academic calendar dates and calendar guidelines for establishing academic dates, as presented.

Rationale: The dates lay out major academic milestones throughout the year and provide guidance to units throughout the campus community as they conduct academic planning within their respective areas.

FOR APPROVAL ([Senate Bylaw 2](#); sections 4.03(c), 5.03(e))

DIGITAL LEARNING PRINCIPLES AND GUIDELINES

2. **Motion:** To approve the Principles and Guidelines for Digital Learning, effective 1 January 2023, as presented.

/kw & twk

Jeff Casello
Associate Vice-President,
Graduate Studies and Postdoctoral Affairs

Charmaine Dean
Vice President,
Research & International

David DeVidi
Associate Vice-President, Academic

**OFFICE OF THE REGISTRAR REPORT TO
SENATE UNDERGRADUATE COUNCIL and
SENATE GRADUATE & RESEARCH COUNCIL**

October 2022

1. REGULATIONS

1.1. Academic Calendar Dates for 2023-2024

Symbols and abbreviations:

(M) Monday, (T) Tuesday, (W) Wednesday, (R) Thursday, (F) Friday, (S) Saturday, (U) Sunday,
N/A – Not Applicable

	Fall 2023	Winter 2024	Spring 2024
Co-operative Work Term Begins	Sept. 5 (T)	Jan. 8 (M)	May 6 (M)
Classes Begin	Sept. 6 (W)	Jan. 8 (M)	May 6 (M)
Holidays	Oct. 9 (M)	Feb. 19 (M) Mar. 29 (F)	May 20 (M) July 1 (M) Aug. 5 (M)
Reading Week	Oct. 7-15 (S-U)	Feb. 17-25 (S-U)	N/A
Convocation	Oct. 20, 21 (F,S)	N/A	June 11-15 (T-S)
Classes End	Dec. 5 (T)	Apr. 8 (M)	July 30 (T)
Make-up Day(s) for in-term holidays	N/A	Apr. 8 (M) for Mar. 29 (F schedule)	May 21 (T) for May 20 (M schedule) July 29 (M) for July 1 (M schedule) July 30 (T) for May 21 (T schedule)
Pre-Examination Study Day(s)	Dec. 6, 7 (W,R)	Apr. 9, 10 (T,W)	July 31, Aug. 1 (W,R)
Examinations Begin	Dec. 8 (F)	Apr. 11 (R)	Aug. 2 (F)
In-Person Exam Days for Online Courses	Dec. 8, 9 (F,S) Dec. 13, 16 (W,S)	Apr. 12, 13 (F,S) Apr. 17, 20 (W,S)	Aug. 9, 10 (F,S) Aug. 14, 17 (W,S)
Examinations on Sunday	Dec. 10 (U)	N/A	N/A
No Exams on the Following Days	Dec. 17 (U)	Apr. 14 (U) Apr. 21 (U)	Aug. 3 (S) Aug. 4 (U) Aug. 5 (M) Aug. 11 (U)
Examinations End (including Emergency Day)	Dec. 22 (F)	Apr. 26 (F)	Aug. 17 (S)
Co-operative Work Term Ends	Dec. 22 (F)	Apr. 26 (F)	Aug. 23 (F)
Teaching days	60	60	60
Pre-examination Study Day(s)	2	2	2
Examination days	13 (+1 Emergency Day)	13 (+1 Emergency Day)	11 (+1 Emergency Day)

Guidelines for Determining Academic Calendar of Dates

The following are principles and guidelines either formally agreed upon by Senate or adopted as common practice in determining the dates for the academic year.

1. That the practice of setting dates for each academic year continues to be an annual exercise.
2. That there be no fewer than **60 teaching days** (12 weeks) in a term. A clear rationale for fewer than 60 teaching days must be communicated to Senate at the time calendar dates are approved. In calculating teaching days in a term, Saturdays, Sundays, and public or University holidays are excluded.
3. That attention be given to **balancing the number of meets** in courses. Where an imbalance may occur because of public holidays, the class schedule for a day different than the calendar day can be used to balance the number of course meets.
4. That **fall convocation** be the Friday and Saturday that fall in the third full week (beginning Sunday) of October.
5. That **spring convocation** be the Tuesday to Saturday in the second full week (beginning Sunday) in June.
6. That the **reading weeks** occur in all faculties in the fall and winter terms. They must begin on the Saturday before the public holidays of Thanksgiving Day and Family Day and will end on the following Sunday.
7. That **fall term** classes begin on the Wednesday following the public holiday of Labour Day.
Exception: The fall term begins on Tuesday, September 8 when Labour Day is September 7.
8. That the start date for **winter term** be set as follows:
 - If January 1 is a Sunday, then start of classes is Wednesday, January 4.
 - If January 1 is a Monday, then start of classes is Wednesday, January 3.
 - If January 1 is a Tuesday, then start of classes is Monday, January 7.
 - If January 1 is a Wednesday, then start of classes is Monday, January 6.
 - If January 1 is a Thursday, then start of classes is Monday, January 5.
 - If January 1 is a Friday, then start of classes is Tuesday, January 5.
 - If January 1 is a Saturday, then start of classes is Wednesday, January 5.
9. The start date for **spring term** be set as follows:
 - If May 1 is a Sunday, then start of classes is Monday, May 2.
 - If May 1 is a Monday, then start of classes is Monday, May 1.
 - If May 1 is a Tuesday, then start of classes is Tuesday, May 1.
 - If May 1 is a Wednesday, then start of classes is Wednesday, May 1.
 - If May 1 is a Thursday, then start of classes is Monday, May 5.
 - If May 1 is a Friday, then start of classes is Monday, May 4.
 - If May 1 is a Saturday, then start of classes is Monday, May 3.
10. That there be no fewer than one **pre-examination study day** and when possible, two pre-examination study days (excluding Saturday, Sunday, and public holidays) between the end of classes and the beginning of examinations. A clear rationale for using fewer than two days or

Saturday, Sunday, and holidays as pre-examination study days, must be communicated to Senate at the time calendar dates are approved.

11. That there be no fewer than 13 **examination days** in the fall and winter terms, and 11 examination days in the spring term. In addition, one Emergency Day with no scheduled examinations is added to the end of the examination period.
12. In calculating **examination days**, Saturdays which fall within the period are included, whereas Sundays and public or University holidays are excluded.

Exceptions:

- Examinations will not be scheduled on the Saturday following Good Friday when that day falls within the examination schedule or the Saturday of the Civic Day weekend.
 - The first Sunday within the examination period may be used when required to accommodate the prescribed number of examination days in the fall term.
13. That for the **fall term's examination period**, no examinations be scheduled beyond December 22. The Emergency Day cannot be scheduled beyond December 23.
 14. That **online course examination days** in each term be the first consecutive Friday and Saturday in the examination period.
 15. **Grades due dates** for on campus courses are normally scheduled seven days from the date of the final examination. Grades for online (Centre for Extended Learning) courses that have a scheduled final examination are due on the last day of the grades submission period. Grades for all courses without a scheduled final examination are normally due 14 days after the start of examinations.
 16. **Co-op work terms** are expected to be 16 week in duration. Actual start and end dates may vary depending on employer or student requirements in consultation with Co-operative Education.

Prepared by:
C. Newell Kelly, Registrar
August 2022

Rules that Require Exceptions with Rationale:

Rule 8

*That the start date for **winter term** be set as follows:*

- *If January 1st is a Monday, then start of classes is Wednesday, January 3rd.*

To allow for adequate transition time between the fall and the winter terms, classes will begin on Monday, January 8, 2024 rather than Wednesday, January 3, 2024.

Rule 9

*The start date for **spring term** be set as follows:*

- *If May 1st is a Wednesday, then start of classes is Wednesday, May 1st.*

To allow for adequate transition time between the winter and the spring terms, classes will begin on Monday, May 6, 2024 rather than Wednesday, May 1, 2024.

Rule 12

... The first Sunday within the examination period may be used when required to accommodate the prescribed number of examination days in the fall term.

With fall term classes beginning September 6, 2023, and the scheduling of two study days prior to the fall final exam period, the first Sunday within the exam period was required for scheduling exams to accommodate the prescribed number of examination days.

... Examinations will not be scheduled on the Saturday following Good Friday when that day falls within the examination schedule or the Saturday of the Civic Day weekend.

Saturday, August 3, 2024 will not be used for schedule of examinations during the 2024 spring term final exam period, as it is the Saturday of the Civic Day weekend.

Rule 14

*That **online course examination days** in each term be the first consecutive Friday and Saturday in the examination period.*

It has been determined that with the expected volume of online courses with in-person exams, additional days will be required, and therefore dates have been selected for the first consecutive Friday and Saturday and second consecutive Wednesday and Saturday of each exam period.

Senate Graduate and Research Council / Senate Undergraduate Council

For Approval

Public

Open Session

To: Senate

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

Presenter: Aldo Caputo, Director, Centre for Extended Learning
Contact Info: acaputo@uwaterloo.ca

Date of Meeting: November 21, 2022

Item Identification:

Digital Learning Principles and Guidelines

Summary:

The Associate Vice-President, Academic (AVPA) is bringing a Digital Learning Principles and Guidelines framework forward to address some needs that have become evident since the start of the Covid-19 pandemic. The framework is in two parts:

1. A set of *Principles and Guidelines* are articulated that are intended to serve as both baseline and guidelines for digital teaching and learning at Waterloo with the goal of ensuring that digital teaching and learning is done in a manner that complies with university policies and Canadian law, meets Waterloo's standards for quality, and clearly communicates to students the expectations around mode of delivery.
2. The framework also outlines a *Review and Approval Process*, but these are procedural matters that do not require Senate approval in the same way. Accordingly, this part of the Framework is for information.

Recommendation/Motion:

To approve the Principles and Guidelines for Digital Learning, effective 1 January 2023, as presented.

Jurisdictional Information:

This item is being submitted to Senate in accordance with [Senate Bylaw 2](#); section 4.03(c) and 5.03(e).

Senate Graduate and Research Council / Senate Undergraduate Council

Governance Path:

1. UOPS (12 April 2021): Aldo Caputo (Director, Centre for Extended Learning; CEL), presents the concept of developing a framework and the rationale to UOPS and receives support to proceed.
2. CEL works internally to develop first draft of framework; Keep Learning Team is consulted and helps revise the draft.
3. AVPA provides feedback.
4. UOPS (23 June 2022): framework presented; UOPS recommends progression to SUC.
5. SUC (4 October 2022): framework presented for discussion; SUC provides feedback and supports motion to recommend to Senate the approval of the framework *Principles and Definitions*.
6. Framework refined based on SUC feedback.
7. DC+ (19 October 2022): framework presented at Deans' Council Plus.
8. SGRC (14 November 2022).

Previous Action Taken:

Described above in section entitled "Governance Path".

Highlights/Rationale:

The need for such a framework has become clear because of the greater prevalence of digital learning since the Covid-19 pandemic. To a great extent, the University has been relying on the fact that most of the digital learning on campus has taken place in online courses developed in partnership with CEL. Partnership with CEL ensured compliance with this framework as a matter of course. Since digital learning materials are increasingly being developed without CEL partnership, it is important that the framework be made explicit. The framework should apply to all internally developed digital learning materials. Being explicit about them opens up greater opportunities for the continued expansion of digital learning on campus, including:

- expanded use of digital resources in all courses;
- potential for a greater variety of course delivery modes than before the Covid-19 pandemic, including current initiatives to expand the use of blended learning; and
- potential for more independently (instructor) created online and blended courses being created with ad hoc or no CEL support, while still assuring adherence to the articulated principles.

Next Steps:

This item is being submitted to the 21 November 2022 Senate agenda subject to SGRC endorsement on 14 November 2022. If SGRC does not endorse the framework, or if it proposes substantive changes thereon (which will require reconsideration at SUC), Senate will be so advised.

Documentation Provided:

- Digital Learning Principles and Guidelines

Digital Learning Principles and Guidelines

Legal Framework

The *Principles and Guidelines for Digital Learning*, including platforms and learning materials, will be construed in accordance with applicable law:

- *Accessibility for Ontarians with Disabilities Act*, 2005, S.O. 2005, c. 11 (AODA) and its regulations
- *Copyright Act*, R.S.C. 1985, c. C-42

If any of these legal provisions are modified, abrogated, superseded, or added to, the *Principles and Guidelines for Digital Learning* will be interpreted in accordance with the new legal framework.

Universal Principles for Digital Learning¹

1. Learning materials and delivery platforms must conform to all relevant University policies, including meeting security, privacy, ancillary fee, and course outline requirements.
2. Platforms and materials must meet or exceed Accessibility for Ontarians Disability Act (AODA) requirements and UW accessibility guidelines.
3. Learning materials must conform to Canadian Copyright law and UW Copyright guidelines.
4. Learning materials are subject to Policy 73 (see brief <https://uwaterloo.ca/associate-vice-president-academic/remote-teaching-and-learning-intellectual-property>) unless covered by separate development agreement or licensing (e.g., Creative Commons or Ontario Open License).
5. Waterloo encourages the reuse of digital materials created at Waterloo as well as the use of open educational materials (OERs) developed elsewhere, in an effort to reduce costs to the institution and to students.
6. Instruction should make use of university-supported platforms that provide adequate instructor and student support and ensure a more consistent teaching and learning experience.

Principles for an ONLINE class:²

1. is indicated in the schedule as “ONLN” and uses the appropriate components and scheduling.
2. can be completed remotely via digital delivery and does not require in-person activity or on-campus presence, except for in-person final exams (which may be supported in the student’s geographic location), although some online programs may have a short on-campus requirement (e.g., orientation session or capstone).
3. has the approval of the Dean or delegate (as determined in each Faculty), or Vice-President Academic & Dean (VPAD), and undergoes appropriate process to ensure quality and compliance with above principles before offer.
4. is recognized as equivalent to all other offers of the same course in terms of course credit, learning outcomes, and academic rigor.³
5. involves instructor effort equivalent to all other modalities.^{3, 4}

¹ “Universal” includes on-campus, blended, and online modalities.

² “Class” is intentionally used here as it denotes a specific offer and section of a course (i.e., there may be other sections or classes of the same course offered in different modes).

³ Online principles 4 and 5 were established by the UW Online Learning Task Force, 2008.

⁴ This principle supposes that modalities should be considered equivalent in terms of instructor workload.

Digital Learning Principles and Guidelines

6. provides regular and timely access to instructors, as well as opportunities for meaningful interaction with instructors, other students, and content.
7. has a schedule that conforms to the academic calendar for the term including start and finish dates and any study breaks, and provides milestones and due dates for activities, assignments, and assessments.
8. uses the appropriate modality (asynchronous or synchronous) for the course content and learning outcomes, with consideration of the needs of the prospective/intended students. Waterloo encourages asynchronous delivery as it offers the greatest flexibility and access, among other benefits.

Guidelines for Specific Online Modes

An asynchronous ONLN class:

1. has no scheduled meets.
2. may include *limited* synchronous elements, for which equivalent alternatives or flexible options exist.
3. has key content elements prepared sufficiently in advance of the course offer to facilitate a quality review, as well as ensure that students have timely access to necessary content during the course.
4. is developed either with the full assistance of CEL through the regular intake process *OR* undergoes an alternative process (see below) to ensure compliance with these guidelines and the academic standards of the Faculty that will offer the course before offer and receives final approval by Dean/VPAD (or delegate) before being scheduled.
5. features regular and substantive interaction, including access to instructors and meaningful interaction among students and instructors.⁵

A synchronous⁶ ONLN class:

1. has regular (usually weekly) scheduled online meets throughout term posted in Quest.
2. provides an alternative for students who cannot attend individual classes (e.g., recording of lectures).
3. has a course design and delivery plan that is reviewed by the Centre for Extended Learning (CEL).
4. is approved by Dean/VPAD (or delegate) before scheduling.

⁵ For reference, the phrase “regular and substantive interaction” is used in the U.S. to delineate between “distance education” and “correspondence education” for the purposes of establishing eligibility for federal aid.

⁶ i.e., a live class facilitated in real time using a tool like Zoom or Teams. This pre-supposes that synchronous online delivery will be a common ongoing strategy; the pending Digital Learning Strategy findings and recommendations may have a bearing on that.

University of Waterloo
UNIVERSITY COMMITTEE ON STUDENT APPEALS (UCSA)
REPORT TO SENATE
21 November 2022

FOR INFORMATION

In accordance with Policy 72 – Student Appeals, the UCSA is to provide an annual report to Senate on the number of student discipline cases heard at the University and faculty levels, their nature and such recommendations as it sees fit to make with respect to matters under its jurisdiction. Provided in this report is the required information for 1 September 2021 to 31 August 2022, as well as the required information for the three years prior.

The numbers reported in the chart below include findings of guilt for graduate and undergraduate students at the University and faculty levels.

In an attempt to preserve confidentiality, cases are not reported by faculty, unit or program. Annual summaries (with identifying student and faculty names removed) of discipline cases, grievances and appeals are posted to the Secretariat’s website: <https://uwaterloo.ca/secretariat/committees-and-councils/university-committee-student-appeals>.

DISCIPLINE OFFENCE	2018-2019	2019-2020	2020-2021	2021-2022
ACADEMIC				
Academic or admission fraud	14	0	0	9
Altering or falsifying a relevant document	26	0	4	5
Cheating	544	1340	2394	869
Contravention of statute	0	0	0	0
Impersonation	25	57	14	0
Misrepresentation	92	25	226	74
Obtaining confidential academic materials	0	4	16	4
Plagiarism	1625	1922	2198	1710
Theft of intellectual property	26	98	405	67
Unauthorized aids or assistance	93	604	1482	409
Unauthorized co-operation or collaboration	1464	1366	3647	2858
Unauthorized resubmission of work	49	12	19	22
Violation of examination regulations	27	159	153	65
Violation of instructor copyright	0	0	450	186
Other	12	1	83	6
NON-ACADEMIC				
Contravention of a statute	0	0	0	0
Disruptive, dangerous, aggressive or threatening behaviour	21	14	7	9
Infringing unreasonably on the work of others	0	1	0	0
Mischief	1	0	0	30
Misuse of University resources	21	2	0	2
Theft	0	0	0	0
Unauthorized use of equipment	0	0	0	0
Unethical behaviour	5	0	14	2

Violation of safety regulations	0	4	401	36
Other	37	10	83	31

26 September 2022
/ns

David DeVidi
Chair

University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
Report to Senate
21 November 2022

Senate Graduate & Research Council met on 3 October 2022 and agreed, in accordance with [Senate Bylaw 2](#) (section 4.03), to forward the following items to Senate for information as part of the consent agenda.

Further details are available at: <https://uwaterloo.ca/secretariat/committees-and-councils/senate-graduate-research-council>

FOR INFORMATION

CURRICULAR SUBMISSIONS

On behalf of Senate ([Senate Bylaw 2](#); section 4.03(f)), council approved new courses, new milestones, and minor program revisions for the Faculty of Mathematics (Combinatorics and Optimization, Data Science).

UNIVERSITY RESEARCH ETHICS

On behalf of Senate ([Senate Bylaw 2](#); section 4.03(c)), council approved the following, as presented:

- Clinical Research Ethics Board – revision to Terms of Reference
- Clinical Research Ethics Board – membership update

/mh kw Jeff Casello
Associate Vice-President, Graduate Studies and
Postdoctoral Affairs

Charmaine Dean
Vice-President, Research & International

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University of Waterloo
SENATE UNDERGRADUATE COUNCIL
Report to Senate
21 November 2022

Senate Undergraduate Council met on 4 October 2022 and agreed, in accordance with [Senate Bylaw 2](#) (section 5.03) to forward the following items to Senate for information or approval, as noted, in the consent agenda.

Further details are available at: uwaterloo.ca/secretariat/committees-and-councils/senate-undergraduate-council

FOR APPROVAL

ACADEMIC REGULATIONS

**Faculty of Engineering
Academic Decisions**

1. **Motion:** That Senate approve the following proposed revisions to the Academic Decisions for the Faculty of Engineering, effective 1 September 2023.

Background and Rationale: Updating language as the current wording of the various academic decisions currently doesn't exactly match what students see on Quest, and the current associated descriptions are unclear or incomplete. Parts of the content in the first paragraph are outdated and other parts are unnecessary.

This Academic Decisions section of the calendar applies to all Engineering programs except for Architecture.

Current calendar text: <http://ugradcalendar.uwaterloo.ca/page/ENG-Examinations-and-Promotions-Academic-Decisions>

Proposed Calendar Text: (underlined and purple = new, strikethrough and red = deletion)

~~At the end of each term, the examining faculty members submit grades for that term's courses. Each department or board then reviews the performance of its students and makes recommendations to the Engineering Examinations and Promotions Committee. The Engineering Examinations and Promotions Committee then considers the evidence on which the recommendations have been made and assigns the official academic decision. An appeal or petition relating to an assigned academic decision, grade, or other evaluation, or relating to other decisions based on University policies, may be made by following the procedures outlined in [Petitions, Grievances and Appeals](#). All academic decisions and grades are reported to the student through the Office of the Registrar.~~

Academic decisions for Engineering students are based on the performance of the student in the current term and may depend on the previous term decision, as outlined in the Rules. The possible academic decisions and their effect on the student's progress are as follows:

1. **Promoted** – A student with this decision proceeds to the next term. For a full-load student,

Promoted appears as EXCL, GOOD, or SAT. EXCL, or excellent, is applied if the weighted term average is 80% or above. GOOD is applied if the weighted term average is 70% or above, but less than 80%. SAT, or satisfactory, is applied if the weighted term average is 60% or above, but less than 70%. A student in a reduced-load program completing their 1A requirements will see Promoted. (Normally appears on transcripts as: EXCL, GOOD, SAT, or Promoted).

2. ~~May Continue in 1A, see advisor.~~ – A student with this decision proceeds to their second 1A Reduced-Load term as part of their first 1A term in Engineering. Thus, the student has zero previous failed terms. ~~permitted to enrol in one more reduced-load term to complete 1A requirements. (Normally appears on transcripts as May Continue in 1A):~~
3. ~~May Continue in 1A no previous failed terms, see advisor.~~ This decision is similar to the May Continue in 1A decision above, however, is used in the case of students with a reduced-load in their first 1A term in Engineering (and thus the student has zero previous failed terms). ~~(Normally appears on transcripts as May Continue in 1A No Penalty).~~ Continue in 1A With Penalty – A student with this decision is permitted to enrol in one more 1A Reduced-Load term to complete their 1A requirements, after a previously unsuccessful attempt at a 1A term or at a 1A Reduced-Load term.
4. ~~Conditional - added to~~ Replaces academic decision 1 or ~~3~~ 2 to indicate that the student has adequate understanding of the term material to permit continuation; however, the failed course(s) must be cleared before graduation. ~~(Normally appears on transcripts as Conditional).~~
5. Promotion Granted – Replaces an academic decision of Conditional when the student clears the failed course(s), except for students in their first 1A Reduced-Load term in their first 1A term. For students in their first 1A Reduced-Load term in their first 1A term, an academic decision of Continue in 1A replaces an academic decision of Conditional when the student clears the failed course.
6. ~~Academic Decision Deferred –~~ A student with this decision may not proceed until specified conditions are satisfied. ~~(Normally appears on transcripts as Decision Deferred).~~
7. ~~Required to Failed - Must Repeat Term –~~ A student with this decision is required to a failed term academic decision requiring that the student repeat the most recent term. Except for 1A students, the student must stay out a minimum of two terms before repeating. ~~(Normally appears on transcripts as Failed – Must Repeat Term).~~
8. May Not Proceed – A student with this decision ~~the student~~ may not proceed to the next degree term nor take required courses from that term until the academic decision has been changed to Promoted or to Conditional. ~~(Normally appears on transcripts as May Not Proceed).~~
9. May Not Proceed COOP - the student A student with this decision has three (or more) missing (or failed) work-term credits and may not proceed to the next term or take required courses from that term until the decision has been changed to Promoted or to Conditional.
10. ~~Failed - Required to Withdraw from Engineering - the student's~~ A student with this decision has their registration in their plan - Bachelor of Applied Science (BASc) or Bachelor of Software Engineering (BSE) - ~~is~~ revoked. Readmission is not possible for four academic terms following the term for which the decision applies. ~~(Normally appears on transcripts as Failed – Required to Withdraw).~~
11. ~~Failed - Required to Withdraw after from 1A Engineering - the student's~~ A student with this decision has their registration in their plan - Bachelor of Applied Science (BASc) or Bachelor of Software Engineering (BSE) - ~~is~~ revoked. Application for readmission may be considered for a qualifying readmission program immediately; however, the term of entry may vary depending on circumstances. ~~(Normally appears on transcripts as Failed – Required to Withdraw from 1A).~~
12. ~~Aegrotat - added to~~ Replaces academic decision 1, 2, or 3. ~~the term result is successful. The student has adequate understanding of the material, but because of illness or other extenuating~~

~~circumstances, normal evaluation for at least one course was not possible. (Normally appears on transcripts as Aegrotat).~~ A student with this decision may continue to the next term even though, due to extraordinary circumstances, normal evaluation for at least one course was not possible.

13. ~~Proceed o~~On Probation - a This academic decision is used in exceptional circumstances ~~that to~~ allows ~~the a~~ student to proceed to the next term. Continued progress in the plan is contingent on satisfying conditions which may be prescribed as the terms of probation. ~~(Normally appears on transcripts as On Probation).~~

Faculty of Engineering Academic Promotion Rules

2. **Motion:** That Senate approve the following proposed revisions to the Academic Promotion Rules for the Faculty of Engineering, effective 1 September 2023.

Background and Rationale: Update to the wording for the promotion rules to make less challenging to navigate. None of the promotion rules are actually changing.

Update to the MNP-coop table to include a line for 4F stream students and to fix a typo in the 4S stream line.

Update to the wording pertaining to work-term report requirements since some programs are replacing separate work-term reports with the reflective reports that are embedded in PD courses.

This Rules section of the calendar applies to all Engineering programs except for Architecture

Current calendar text: <http://ugradcalendar.uwaterloo.ca/page/ENG-Examinations-and-Promotions-Rules>

Proposed Calendar Text: (underlined and purple = new, strikethrough and red = deletion)

The following rules are applied when students' performance is assessed; unless otherwise stated the rules apply to reduced-load 1A, reduced-load, and full-load terms. There are several decision descriptors that can be added to the decision described in the rules below.

1. All (full-load) students are expected to enrol in at least the number of courses specified in this Calendar= for the corresponding term of their plan. A reduced-load student may drop one elective course per term= (as defined by their plan) by obtaining the approval of their academic advisor. These are the courses= used to calculate the term average, which is the basis of promotion decisions. Courses not included in= the degree, term average, or failure count must be identified at the time of enrolment (see Rule ~~11~~ 12).= See Rule ~~15~~ 16 for information regarding changing a course's designation. The designation of these= courses may be changed (with the approval of the department) at any time prior to four weeks before= the first day of the Final Examination Period for that term. Reduced-load 1A students must enrol in= three courses (a load of at least 1.5 and normally less than a full load) as specified by their academic= advisor. Normally, the reduced-load 1A term will be composed of at least two core courses from the= 1A term with other courses specified by the academic advisor in consultation with the student.
2. ~~Term decisions are described in the tables below. There are a number of decision descriptors that can= be added to the decision described in the rules following the table.~~ The term decision is based on the= student's course load during the term, the previous term decision, the term average for the current= term, and the number of courses taken that term with grades below 50. The term average is

calculated= using the weight of the course, the status of the course (e.g., DRNA), and the interpreted course grade.= All grades above 32 are interpreted as the submitted grade. Courses with a submitted grade below 32= are interpreted for averaging purposes, as having a value of 32. Both the number of courses below 50=in the current term as well as the cumulative number of To Be Cleared (TBC) courses (the TBC count) on a student's record can be part of the decision.

Full- and reduced-load terms (excluding reduced-load 1A terms):

Previous Decision	Term average greater than or equal to 60 and: 0. No failed courses 1. Full-load term, one or two failed courses, and less than three TBC courses 2. Reduced-load term, one failed course, and less than three TBC courses 3. TBC courses more than two, and term 2A or higher	Term average greater than or equal to 50 but less than 60, or Term average greater than or equal to 60 and either 1. full-load term and more than two failed courses, or 2. reduced-load term and more than one failed course	Term average less than 50
Promoted	1. Promoted 2. Promoted (conditional) 3. Promoted (conditional) 4. May Not Proceed	Failed—Required to Repeat	Failed—Withdrawal Required
No previous term	1. Promoted 2. Promoted (conditional) 3. Promoted (conditional) 4. May Not Proceed	Failed—Required to Repeat	Failed—Withdraw from 1A
Failed—Required to Repeat	1. Promoted (if no failed courses) 2. Failed—Withdrawal Required (any failed courses) 3. Failed—Withdrawal Required (any failed courses) 4. Failed—Withdrawal Required	Failed—Withdrawal Required	Failed—Withdrawal Required

For students in full-load terms and reduced-load terms, the term decision is based on the current term average, the number of courses taken during the term with a grade below 50%, the previous term decision, and in some cases one or more of, the course load, the level, and the TBC count.

1. Students with a term average of 60% or greater and no course grades below 50% are promoted with a term decision of SAT (satisfactory), GOOD, or EXCL (excellent).
2. Students with a term average of 60% or greater with one or more course grades below 50%

who are in their first term of Engineering or whose previous term decision was not Failed – Must Repeat Term, the term decision depends on the level and, for students at level 2A or above, on the TBC count. The TBC count includes courses in the current term with grades below 50%. There are several decision descriptors that can be added to the decision described in the rules below.

3. Students in 1A or 1B, the term decision depends on the course load and the number of course grades below 50%.
 1. Students on a full-course load with no more than two course grades below 50% are promoted with a term decision of **Conditional**.
 2. Students on an elective reduced-course load with no more than one course grade below 50% are promoted with a term decision of **Conditional**.
 3. Students on a full course load with more than two course grades below 50% have a term decision of **Failed – Must Repeat Term**.
 4. Students on an elective reduced-course load with more than one course grade below 50% have a term decision of **Failed – Must Repeat Term**.
2. Students in 2A and beyond with a TBC count below three, the term decision depends on the course load and the number of course grades below 50%.
 1. Students on a full course load with no more than two course grades below 50% are promoted with a term decision of **Conditional**.
 2. Students on an elective reduced-course load with no more than one course grade below 50% are promoted with a term decision of **Conditional**.
 3. Students on a full course load with more than two course grades below 50% have a term decision of **Failed – Must Repeat Term**.
 4. Students on an elective reduced-course load with more than one course grade below 50% have a term decision of **Failed – Must Repeat Term**.
3. Students in 2A and beyond with a TBC count above two have a term decision of **May not Proceed**.
3. Students with a term average below 60% and/or one or more course grades below 50%, whose previous term decision was Failed – Must Repeat Term have a term decision of **Failed – Required to Withdraw**.
4. Students with a term average of 50% or greater, but less than 60% who are in their first term of Engineering or whose previous term decision was not Failed – Must Repeat Term, have a term decision of **Failed – Must Repeat Term**.
5. Students with a term average less than 50% who are in their first term of Engineering have a term decision of **Failed – Required to Withdraw from 1A**.
6. Students with a term average less than 50% who are not in their first term of Engineering have a term decision of **Fail – Required to Withdraw**.

Reduced-load 1A terms:

Previous Decision	Term average greater than or equal to 60 and: 1. No failed courses 2. One failed course	Term average greater than or equal to 60 and more than one failed course, or term average	Term average less than 50
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		greater than or equal to 50 but less than 60	
No previous term	1. May Continue in 1A No Failed Terms 2. May Continue in 1A No Failed Terms (Conditional)	Failed—Required to Repeat	Failed—Withdraw from 1A
MC1A—May Continue in 1A, see advisor	1. Promoted 2. Failed—Withdrawal Required	Failed—Withdrawal Required	Failed—Withdrawal Required
MC1A0—May Continue in 1A No Previous Failed Terms, see advisor	1. Promoted 2. Promoted (Conditional)	May Continue in 1A	Failed—Withdraw from 1A
Failed—Required to Repeat, see advisor	1. May Continue in 1A 2. Failed—Withdrawal Required	Failed—Withdrawal Required	Failed—Withdrawal Required

For students in the 1A Reduced-Load Program (RLP), the term decision depends on the term (i.e., the first 1A RLP term or the second 1A RLP term) and is based on the current term average, the number of courses taken during the term with a grade below 50%, and the previous term decision.

1. Students with a term average of 60% or greater and no course grades below 50%, the term decision depends on the term.
 1. Students in the first 1A term of the RLP, the term decision depends on the previous term decision.
 1. Students in their first 1A RLP term continue in the RLP with a term decision of **Continue in 1A**.
 2. Students whose previous term decision was Failed – Must Repeat Term continue in the RLP with a term decision of **Continue in 1A With Penalty**.
 3. Students in the second term of the RLP are promoted with a term decision of **Promoted**.
 2. Students with a term average of 60% or greater and one course grade below 50%, and whose previous term decision was neither Failed – Must Repeat Term nor Continue in 1A With Penalty, the term decision depends on the term.
 1. Students in their first 1A RLP term continue in the RLP with a term decision of **Conditional**.
 2. Students in their second 1A RLP term are promoted with a term decision of **Conditional**.
 3. Students with a term average of 60% or greater and more than one course grade below 50%, and whose previous term decision was neither Failed – Must Repeat Term nor Continue in 1A With Penalty, the term decision depends on the term.
 1. Students in their first 1A RLP term have a term decision of **Failed – Must Repeat Term**.
 2. Students in their second 1A RLP term have a term decision of **Continue in 1A**.

With Penalty.

4. Students with a term average below 60% and/or one or more course grades below 50%, and whose previous term decision was Failed – Must Repeat Term or Continue in 1A with Penalty, the term decision is Failed – Required to Withdraw.
 5. Students with a term average of 50% or greater but less than 60%, and whose previous term decision was neither Failed – Must Repeat Term nor Continue in 1A With Penalty, the term decision depends on the term.
 1. Students in their first 1A RLP term have a term decision of Failed – Must Repeat Term.
 2. Students in the second 1A RLP term have a term decision of Continue in 1A With Penalty.
 6. Students with a term average less than 50%, and whose previous term decision was neither Failed – Must Repeat Term nor Continue in 1A With Penalty, are Required to Withdraw from 1A.
3. ~~(Conditional) is appended to Promoted, May Continue in 1A, and May Continue in 1A No Failed Terms decisions if the student has a minimum average of 60% and fewer than three failed courses for a promoted decision with a full load term, or fewer than two failed courses for a Promoted decision with reduced load term, or May Continue in 1A or May Continue in 1A No Failed Terms. If an academic decision of Conditional is used in place of a Promoted or May Continue in 1A, decision, the~~ condition may be satisfied only by successfully clearing the failed course(s) (see the [Introduction](#)).

Once the condition is satisfied, the ~~(Conditional) is removed from the decision~~ is replaced with a decision of Promotion Granted or May Continue in 1A. No student may obtain the Bachelor of Applied Science (BASc) or Bachelor of Software Engineering (BSE) degree with an academic decision including (Conditional) remaining on their record.

4. (Aegrotat) is appended to Promoted, May Continue in 1A, ~~May Continue in 1A No Failed Terms~~, and Proceed on Probation decisions if one or more courses are graded as AEG (Aegrotat, credit granted under extenuating circumstances) and the other conditions for the decision are met.
<<#5 becomes #6, and #6 becomes #5>>
5. While repeating ~~the a~~ term, a student shall be excused from repeating individual courses in which a grade of 70% or better has been achieved. If this occurs, substitute courses, as approved by the department, must be taken, such that the student takes at least a reduced load in the repeat term.
6. (No Penalty) may be appended to the decision to repeat a term. In this case, the requirement to stay out for two terms before repeating the term is waived and the term is not counted as a repeat term with regard to the number of times a term can be repeated or in the calculation of the total number of terms of full-time study in the plan. This condition is normally applied as a result of extenuating circumstances which significantly affect the student's performance in the failed term.
7. ~~A full load student, at level 2A or higher, who achieves a minimum term average of 60% and has failed zero, one, or two courses in that term for a cumulative total of three or more TBC courses will receive the decision May Not Proceed (MNP). A reduced load student at level 2A or higher, who achieves a minimum term average of 60% and has failed zero or one course in that term for a cumulative total of three or more TBC courses will receive the decision May Not Proceed.~~ Normally, ~~the a~~ student with an academic decision of May Not Proceed (MNP) will enrol in a non-degree term devoted to retaking or replacing all or as many as possible of the TBC courses. ~~In the event that~~ If some of the TBC courses are not available, the department may specify equivalent or appropriate alternative courses to be taken in their place. If the student is otherwise in good standing, the academic decision will be changed to Promoted when the number of TBC courses has been reduced to none. If the student is otherwise in good standing, the academic decision will be changed to Promoted (Conditional) when the number of TBC courses has been reduced to one. A student clearing TBC courses under this rule must achieve a minimum grade of 50% for failed courses and a minimum grade

- of 60% for dropped courses, otherwise the student will be Required to Withdraw from Engineering.
8. The plan must be completed in no more than 10 terms of full-time (full-load or reduced-load) study; that is, no more than two repeat terms are allowed. A student receiving a third failed term academic decision will be Required to Withdraw from Engineering. Both full-load and reduced-load students are in this category.
 9. In extraordinary circumstances, a student with a term average below 60% may be allowed to Proceed on Probation or if any course grade is AEG (see [Rule 3](#)) may be allowed to Proceed on Probation (Aegrotat).
 10. A student may be Required to Withdraw from Engineering at any time if in the opinion of the Faculty the student is unlikely to benefit from further participation in Engineering, the student leaves the plan without notification and fails to write examinations (receives a grade of [DNW](#) [Did not write examination, no credit granted, value 32] for some courses), or the student has made two or more unsuccessful attempts to clear the same failed course.
 11. Courses taken by students during work terms will not be included in the average for any term. However, the grades for the courses taken at the University of Waterloo or at another university on a Letter of Permission will be reported on the student's transcript. Courses taken during work terms are eligible to be used towards a reduced-load term.
 12. There are five types of courses applicable to Engineering undergraduate plans (BASc or BSE): depending on whether the course is part of the degree requirements, or not; whether the course will be included in term average calculations, or not; and whether the course is in the TBC count, or not. These courses are shown on the student record and transcripts as follows:

Description	Designation	Degree Requirement	In Average	In To Be Cleared (TBC) Count
Plan requirement, included in average	blank	Yes	Yes	Yes
Plan requirement, not included in average, in TBC count, supplemental exam (SUPP) not permitted	DRNA	Yes	No	Yes
Plan requirement, not in average, and not in TBC count	DRNC	Yes	No	No
Not required for plan, in average, not in TBC count	TRIA	No	Yes	No
Not required for plan, not in average	NRNA	No	No	No

With the exception of work-term reports (see [Rule 17 18](#)), a mixture of courses of type DRNA and courses of type TRIA will not be permitted in a single term. Grades for courses that are not included in the term average or not required for the plan will be reported on the student's transcript. Undergraduate students (BASc or BSE) are not permitted to enrol in any course in an audit category. The Faculty of Engineering does not permit other undergraduate students to enrol in Engineering courses in an audit category.

13. DRNC courses, while not in the TBC count, are normally associated with courses that must be completed by a certain point (i.e., must be completed before the end of 3A). That point is referred to as the completion date and is provided in the plan description portion of this Calendar for those plans that use DRNC courses. A student that has not completed the course successfully by the completion date will receive a May Not Proceed decision.

14. Although it is the Senate of the University that confers degrees, the Faculty of Engineering does recommend students for degrees in Engineering. A student who has successfully met all of the requirements will be Recommended for the BAsC or BSE degree. The degree awarded will be the one associated with the plan of registration. A student who has demonstrated exceptional performance will be Recommended for the BAsC or BSE Degree with Distinction. This recognition is granted to a student who has a cumulative average of 80% or greater, starting with their first enrolment in the 3A term, of those courses that are requirements for their plan, and that have been included in a corresponding term average (i.e., those courses of type blank above). Courses taken while on exchange, or terms for which the academic decision has Aegrotat added as a qualifier, do not contribute to the cumulative average. In such cases, the cumulative average will include the most recent four academic terms completed at Waterloo for which a numerical average is available.
15. Most courses at the University of Waterloo are assigned a numerical grade (between zero and 100) by the examiners. Any grade from zero to 32 is treated as having a value of 32 when averages (for promotions and awards) are calculated. Non-numerical grade definitions and university-level processes are included in the [Grades](#) section of this Calendar.
16. Changes to the set of courses included in the term average, which students take in a particular term, may be permitted at the discretion of the student's department. Such changes must normally be arranged and approved before the end of the Drop/Add Period, specified in the [Calendar of Events and Academic Deadlines](#). After this period, only exceptional cases will be considered. Courses not included in the average in any academic term may be dropped at any time prior to the start of Drop with WF Period, and courses will be graded as WD (withdrew).
17. Students are expected to maintain a balance between the number of academic terms completed and the number of work-term credits earned. Situations that are defined as out of balance are characterized in the table below. For example: 1 (4) - meaning one work-term credit, four work-term opportunities, that would otherwise earn a decision permitting them to enrol in the next academic term, will receive a term decision of **May Not Proceed COOP** and will be unable to enrol in an academic term until they have completed at least two more work terms. Normally, this will require an absence from academic study for one year. During the one year following the academic term with this decision, the student is expected to find employment that can be treated as (at least) two work terms, recovering the work-term credits required to continue academically.

May Not Proceed COOP

Number of Credited COOP courses (minimum number of opportunities) Current Academic Term (Excellent, Good, Satisfactory, Conditional)

Stream	2B	3A	3B	4A	4B
4	0 (3)	1 (4)	2 (5)	3 (6)	3 (6)
8	not applicable	0 (3)	1 (4)	2 (5)	3 (6)
4D	0 (3)	1 (4)	1 (4)	3 (6)	3 (6)
8D	not applicable	0 (3)	2 (5)	3 (6)	3 (6)
4F	0 (3)	1 (4)	1 (4)	2 (5)	3 (6)
4S	0 (3)	1 (4)	2 (5)	3 2 (5)	3 (6)
8S	not applicable	0 (4)	1 (4)	3 (6)	3 (6)
8X	not applicable	0 (3)	1 (4)	3 (6)	3 (6)

Once the student has earned credit for two or more additional work terms, the term decision will be changed to the normal academic decision for the term.

18. ~~Three work term report credits are required of all BAsE and BSE students. A work term report credit is obtained by achieving a grade of satisfactory or better for a work term report course. No student will be allowed to graduate without having achieved the required work term report credits.~~

Work-term report ~~courses~~ requirements are plan dependent and may be met through technical reports, reflective reports, presentations, or some alternative method. ~~specified in the plan section of this Calendar, and depending on the plan, may require reports, presentations, or some alternative method of meeting this requirement.~~ If the plan specifies its own courses then those courses may be included in the term average, or excluded from the average. Some plans may use the common work-term report courses (WKRPT 100, WKRPT 200 ~~or~~ WKRPT 201, WKRPT 300 ~~or~~ WKRPT 301, and WKRPT 400 ~~or~~ WKRPT 401). For the plans using the shared courses, the following regulations are in place.

Work-term reports submitted as one of the WKRPT courses are due seven days after the first official day of lectures of the academic term in which the report is required. Reports submitted after the deadline will receive grades of **Unacceptable (38)** and will be carried forward to the following academic term for evaluation, and are not eligible for prizes. Failed work-term reports are cleared by retaking the WKRPT course and passing it in a subsequent term.

Work-term report courses WKRPT 100, WKRPT 200, WKRPT 300, and WKRPT 400 are considered to be required courses of type DRNA: failed work-term report evaluations contribute to the accumulated failed course count (see Rule 6). For failed work-term reports, the original grade will appear in the grade field. The failed course will be corrected by retaking and passing the course in a subsequent term.

~~Work-term report courses WKRPT 201, WKRPT 301, and WKRPT 401 are considered to be required courses of type DRNC: failed work-term report evaluations do not contribute to the accumulated failed course count but will delay progress if not completed by the specified term (see Rule 12 **13**). For failed work-term reports, the original grade will appear in the grade field. The failed course will be cleared by retaking and passing the course in a subsequent term.~~

When a work-term report (submitted as one of the WKRPT courses) has been submitted and the grade obtained is **Resubmit**, the student must provide any subsequent submissions by the date lectures end for that term, as specified in this Calendar, in order for those submissions to be considered in that term. Failure to clear a **Resubmit** by the lectures end date will result in a grade of **Unacceptable (38)**. Any submissions after the lectures end date will be deemed to be new submissions and to have been submitted for consideration in the following term.

Faculty of Environment Undergraduate Communication Requirement

3. **Motion:** That Senate approve the following proposed revisions to the Undergraduate Communication Requirement for the Faculty of Environment, effective 1 September 2023.

Background and Rationale: Allowing external transfer credits to count towards the ENV UCR milestone, will alleviate confusion for students and will bring ENV rules in line with Arts, Math, and Engineering.

Upon admission to ENV from an external accredited post-secondary institution, equivalent courses to those listed specific to each plan, that meet the University of Waterloo grade equivalent of a least 65%,

will qualify for a transfer credit and UCR milestone. If the grade is not considered equivalent to a 65%, then the transfer credit will not be granted. Upon approval of this motion, the Registrar's admission team will be notified for implementation for non-OSS admissions, effective September 2023.

This revision aligns with recent decisions made by the ENV Petitions Committee for the June 2022 convocation in which external transfer credits that met the grade equivalent threshold were approved for the UCR milestone.

The rule regarding future registrations being cancelled if the UCR milestone has not been met by the completion of 2B has been removed, as this rule has never been implemented. Instead students are directed to their academic advisor to discuss the completion of this requirement if not met by 2B.

All other changes to this section are editorial in nature.

Current calendar text: <http://ugradcalendar.uwaterloo.ca/page/ENV-Overview-of-Academic-Plan-Requirements>

Proposed calendar text: (bold = new, strikethrough = deletion)

Undergraduate Communication Requirement

Bachelor of Environmental Studies, Bachelor of Knowledge Integration, and Bachelor of Science

The [University](#) requires that all students ~~have~~ **demonstrate** basic competency in English language communications – oral, written, and other media. First-year ~~required~~ **core** courses have been identified in each ~~major~~ **academic plan** that provide the English language communication skills needed for successful completion of degree requirements. These courses are:

- Bachelor of Environmental Studies (BES):
 - Environment and Business: [ENVS 131](#)
 - Environment, Resources and Sustainability: [ERS 101](#)
 - Geography and Aviation, Geography and Environmental Management, and Geomatics: [ENGL 109](#) or [EMLS 129R](#)
 - International Development: [INDEV 101](#)
 - Planning: [PLAN 102](#)
- Bachelor of Knowledge Integration (BKI):
 - Knowledge Integration: ~~[SPCOM 223](#)~~ [COMMST 223](#)
 - Bachelor of Science (BSc):Climate and Environmental Change: [ENGL 109](#) or [EMLS 129R](#)

The Undergraduate Communication Requirement (UCR) milestone on a student's academic record will indicate that one of the following rules has been met:

- 1. The above listed core course for the student's academic plan, or one of the other above listed courses, has been completed with a final grade of 65% or higher.**
- 2. The UCR milestone has been earned by the student while enrolled in another University of Waterloo faculty.**
- 3. At time of admission to the Faculty of Environment, a transfer credit from an external accredited post-secondary institution has been granted for one of the above listed courses.**

Notes:

- Earning an UCR milestone and the satisfactory completion of the listed core course specific to each academic plan are two unique and distinct degree requirements. Both requirements must be satisfied to be eligible for a Faculty of Environment degree.
- Students who have not attained the UCR milestone by the end of their 2B term must meet with their academic advisor to discuss the completion of this requirement.
- If a grade of 65% or higher is not achieved in the core course listed for the academic plan, a student may be eligible to repeat the course to meet the UCR milestone requirement (see [Academic Standing](#) as well as the [Courses, Enrolment, and Grades](#) pages of this Calendar for more information on repeating courses).

To demonstrate competency in communications, students must achieve a grade of 65% or higher in the identified course for their academic plan.

Students who do not achieve this grade must fulfil this requirement by the end of their 2B term in one of the following ways:

- Repeating the course and achieving 65% or higher (see [Academic Standing](#) as well as the [Courses, Enrolment, and Grades](#) pages of this Calendar for more information on repeating courses).
- Completing any of the above listed courses and achieving 65% or higher. Students may require the permission of the academic unit offering the course to enrol.

Notes for the BES, BKI, and BSc academic plans

- ~~1. An Undergraduate Communication Requirement (UCR) milestone on a student's academic record will indicate successful completion of this requirement.~~
- ~~2. Students who have not completed the Undergraduate Communication Requirement by the end of second year will have their future registrations cancelled and will be allowed to proceed only after successful completion of this requirement.~~
- ~~3. Specialized sessions are available through the [Writing and Communication Centre](#) and are open to all students. Students are also invited to visit the Writing and Communication Centre during drop-in hours for course work assistance. The Writing and Communication Centre does not charge students for its services.~~
- ~~4. Transfer credits from an external institution cannot be used to satisfy the Undergraduate Communication Requirement.~~
- ~~5. Students transferring into the Faculty of Environment who have completed any of the above courses with the required grade of 65% will be granted the UCR milestone.~~
- ~~6. An UCR milestone obtained while enrolled in another University of Waterloo faculty will satisfy this requirement.~~

Bachelor of Sustainability and Financial Management (BFSM)

Information on the Undergraduate Communication Requirement for the Bachelor in Sustainability and Financial Management can be found on the [degree requirement page for the program](#). This program is offered jointly by the faculties of Arts and Environment but follows the Faculty of Art's rules and regulations.

FOR INFORMATION

ACADEMIC PROGRAM REVIEWS

Council reviewed and approved the following reports on behalf of Senate:

- Final Assessment Report (FAR) Anthropology [Appendix 1]
- Two-Year Progress Report (PR) Anthropology [Appendix 2]

MINOR PLAN & CURRICULAR MODIFICATIONS

Council approved the following on behalf of Senate:

- Minor plan changes for the Faculty of Engineering (architectural engineering, school of architecture, biomedical engineering, chemical engineering, civil engineering, computer engineering, electrical engineering, environmental engineering, geological engineering, management engineering, mechanical engineering, mechatronics engineering, nanotechnology engineering, systems design engineering, artificial intelligence option, biomechanics option, management sciences option, complementary studies electives list); the Faculty of Environment (climate and environmental change, knowledge integration honours, knowledge integration honours and joint honours, knowledge integration collaborative design specialization, knowledge integration science, technology, and society specialization); the Faculty of Mathematics (undergraduate communication requirement, general degree, the repeat rule, artificial intelligence specialization, mathematics/chartered professional accountancy and data analytics specialization, co-op work term report requirements); Computing and Financial Management; and Software Engineering.
- New courses for the Faculty of Engineering (general engineering, biomedical engineering, mechanical engineering); the Faculty of Environment (school of environment, resources & sustainability, geography & environmental management); the Faculty of Mathematics (applied mathematics, statistics & actuarial science); Computing and Financial Management; and Sustainability and Financial Management.
- Course changes for the Co-operative Education Council (interdisciplinary studies); the Faculty of Engineering (architectural engineering, biomedical engineering, civil engineering, electrical & computer engineering, mechatronics engineering, nanotechnology engineering, systems design engineering); the Faculty of Environment (dean of environment, school of environment, resources & sustainability, geography & environmental management, knowledge integration, school of planning, school of environment, enterprise & development); and the Faculty of Mathematics (combinatorics & optimization, David R. Cheriton school of computer science, dean of mathematics, statistics & actuarial science).
- Course inactivations for the Faculty Engineering (architectural engineering, computer engineering, nanotechnology engineering); the Faculty of Environment (co-operative education & career action, geography & environmental management); and the Faculty of Mathematics (dean of mathematics).

/twk

David DeVidi
Associate Vice-President, Academic

Final Assessment Report

Anthropology (BA, Minor), Public Issues Anthropology (MA)

June 2021

Executive Summary

External reviewers found that the Anthropology (BA, Minor) and Public Issues Anthropology (MA) delivered by the Department of Anthropology were in good standing.

“Our overall assessment is that it is a very good program that has the potential to be better. We were very impressed by the full-time and sessional faculty members we met, and based on our conversations with them, we feel that they are ready and willing to make the most of the opportunities for improvement we are recommending.”

A total of 3 recommendations were provided by the reviewers, regarding governance, structure, curriculum, and support. In response, the program created a plan outlining the specific actions proposed to address each recommendation as well as a timeline for implementation. The next cyclical review for this program is scheduled for 2026-2027.

Student Complement (All Years)

	Anthropology				Public Issues Anthropology
	General	Honours	Co-op	Minor	MA
Fall 2020	3	26	8	23	20
Fall 2019	6	24	9	19	18
Fall 2018	9	26	6	16	12

*based on Active Students Extract retrieved from Quest December 21, 2020.

Background

In accordance with the University of Waterloo’s Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response of the Anthropology (BA, Minor) and Public Issues Anthropology (MA) delivered by the Department of Anthropology. A self-study (Volume I, II, III) was submitted to the Associate Vice-President, Academic and Associate Vice-President, Graduate Studies and Postdoctoral Affairs on October 18, 2019. The self-study (Volume I) presented the program descriptions and learning

outcomes, an analytical assessment of the programs, including the data collected from a student survey, along with the standard data package prepared by the Office of Institutional Analysis & Planning (IAP). The CVs for each faculty member with a key role in the delivery of the program(s) were included in Volume II of the self-study.

From Volume III, two arm's-length external reviewers were selected by the Associate Vice-President, Academic and Associate Vice-President, Graduate Studies and Postdoctoral Affairs: Dr. Rob Hoppa, Professor of Anthropology, University of Manitoba, and Dr. Andrew Walsh, Associate Professor of Sociocultural Anthropology, Western University.

Reviewers appraised the self-study documentation and conducted a site visit to the University on February 10-11, 2020. An internal reviewer from the University of Waterloo, Dr. Peter van Beek, Professor of Computer Science, was selected to accompany the external reviewers. The visit included interviews with the Vice-President, Academic & Provost; Associate Vice-President, Academic and Associate Vice-President, Graduate Studies and Postdoctoral Affairs; Dean of the Faculty of Arts; Arts Associate Deans of Undergraduate Programs, Graduate Studies, and Research, respectively; Chair and Associate Chairs of the Department of Anthropology, as well as faculty members, staff and current undergraduate and graduate students. The Review Team also had an opportunity to tour the facilities and meet with representatives from the Library.

Following the site visit, the external reviewers submitted a report on their findings, with recommendations. In response, the program responded to each recommendation and outlined a plan for implementation of the recommendations. Finally, the Dean responded to the external reviewers' recommendations, and endorsed the plans outlined by the program.

This final assessment report is based on information extracted, in many cases verbatim, from the self-study, the external reviewers' report, the program response and the Dean's response.

Program Characteristics

Anthropology (BA, Minor): Upon completing a bachelor's degree, a student will be cognizant of the diversity of the human condition around the world, historically and today, and will be able to utilize the techniques of research design and field methods used in socio-cultural anthropology, archaeological anthropology, and biological anthropology. All degrees in Anthropology require a core set of three second-year courses in Socio-cultural, Archaeological and Biological Anthropology, three sub-fields of Anthropology.

- **Three-year General BA:** requirements include 30 courses, of which 10 are in Anthropology, plus six courses at the 300-level or above, with at least one 400-level course; a minimum overall average of 60% and a minimum major average of 65%.
- **Four-year General BA:** requirements include 40 courses, of which 16 are in Anthropology, plus ten courses at the 300-level or above, with at least two 400-level courses; a minimum

overall average of 60% and a minimum major average of 65%.

- **Honours BA:** requirements include 40 courses, of which 16 are in Anthropology, plus ten courses at the 300-level or above, with at least two 400-level courses; a minimum overall average of 60% and a minimum major average of 70%.
- **Minor:** requirements include eight courses in Anthropology with a minimum Anthropology average of 65%.

Public Issues Anthropology (MA): Students who complete the Public Issues Anthropology Master's program should also be able to utilize anthropological knowledge in ways that are relevant to issues of demonstrated interest to society.

- **MA in Public Issues Anthropology:** requirements include three core courses plus one elective, with a minimum average of 80%, as well as the preparation and defense of a research thesis.

Summary of Strengths, Challenges and Weaknesses based on Self-Study

Undergraduate Program

Strengths

- In this relatively small program, students get to know, and support, each other well, and students and faculty get to know each other well, too.
- There is an array of student awards and scholarships that help to support the education and professionalization of students.
- Important to a number of students are the opportunities provided by the University of Waterloo's Co-op programs, in particular, the Arts and Business Co-op. Beyond Co-op, students have many opportunities for experiential learning, including hands-on laboratory work in biological and archaeological anthropology, as well as in field schools and study abroad courses.
- In a recently conducted survey of current undergraduates and alumni, students were impressed by the breadth and variety of courses on offer in the Department and how these courses complemented those in other disciplines (e.g., Psychology and History).
- Students were also pleased with the helpful and passionate nature of their professors, and delighted with the opportunities for experiential education in the form of field schools, study abroad courses, and laboratory-based courses.

Challenges

- The main challenge of this undergraduate program is to attract and retain undergraduate students.
- A further challenge is the inability to offer all courses every year, or at least predictably, so that students can plan ahead better.

- It has been challenging to claim a place or voice for anthropology on campus, as we keep being surprised by a certain innocence of our interlocutors about what anthropology can contribute to various discourses and debates. This challenge is aggravated by new or proposed Minor and Major programs in the Faculty of Arts that resonate with core concerns of (socio-cultural) anthropology (Cultural Identities, in particular), but have involved Anthropology only marginally.
- One of the enduring challenges is space. There is no lounge and/or meeting room that would help making the Department a comfortable environment for students to interact among themselves and with faculty. Given additional osteological collections that will arrive in conjunction with the Jordan field school, the tight limits of storage space are an additional concern.
- In a recently conducted survey, undergraduates thought the Department should employ new media technologies (e.g., video essays and podcasts) to better engage with the public and further strengthen the program.
- In addition to the need for better communication and outreach, students also commented on the lack of resources available to support undergraduate education, particularly in regard to preparing students for careers outside academia.

Weaknesses

- Anthropology lacks another faculty position in archaeology, a subfield that students have expressed much interest in, but in which offerings are limited because of the existing faculty complement.
- Curriculum revisions following the last program review removed a required 300-level course on the History of Anthropological Theory. This may weaken graduates' applications to other programs.
- Introductory courses (particularly ANTH 100, 201 and 202) are periodically taught by sessional instructors, but Anthropology is unable to tell students when these instructors will again teach courses again.
- The survey of current and former Undergraduates indicated that some students felt there were not enough courses on offer from term to term. Moreover, of those courses on offer, some felt the same topics were taught too frequently. It was also suggested that upper-year offerings did not properly build from concepts learned in earlier 'core courses' (i.e., ANTH 201, 202, and 204).

Graduate Program

Strengths

- The small sizes of the MA student cohorts and the small size of the Department facilitate students' interactions among themselves and with all faculty members.
- The program is unique in its Public Issues focus and in that it incorporates theory, perspectives, approaches, and methods from sociocultural, biological, and

archaeological anthropology. There is one faculty member who is a linguistic anthropologist, thus giving the small program the full breadth of North American anthropology's four- fields.

- With three required courses and one elective, coursework is flexible to meet student interests. With a length of 16 months, the program is compact; students typically finish on time, the completion rate is high, and students are offered a competitive funding package.

Challenges

- Application numbers have improved significantly, with an especially strong interest in biological and archaeological anthropology, but lesser interest in socio-cultural anthropology. This aggravates a shortage of office space for graduate students.
- With individual students' interests often being oriented toward a single subfield of anthropology, teaching adequately across the three subfields in required graduate courses has been a challenge as well.
- Providing adequate supervision when advisors are on sabbatical or other leave is an ongoing challenge for the MA program, especially given its relatively short duration.

Weaknesses

- The January graduation date has posed employment challenges especially for archaeological anthropologists whose work may be weather-dependent. This is part of a broader concern regarding post-MA employment. In survey responses, many (~75%) students report a 3-6 month delay in finding employment, compared with only ~12% who have employment arranged prior to completion.
- The lack of funding for international students significantly limits the ability to attract international students.

Summary of Key Findings from the External Reviewers

The reviewers' assessment is that this is a very good program that has the potential to be better. The reviewers were very impressed by the full-time and sessional faculty members with whom they met, and based on these conversations, they feel that faculty are ready and willing to make the most of the opportunities for improvement the reviewers are recommending.

The external reviewers found that the chief strengths of the program are to be found in the people who make it up. With the exception of several senior faculty members who are likely nearing retirement, most members of the Department are relatively junior. Most have active (and mostly funded) research projects on the go and are participating in all aspects of undergraduate and graduate programs. In addition, the program has been benefiting greatly

from the dedicated efforts of a number of sessional instructors, and, over the past year, from the work of a single staff-member with a great deal on her plate.

The major challenges currently facing the program relate to departmental governance and undergraduate enrolments. Accordingly, we are making two major recommendations that should serve to address these two major challenges.

Program Response to External Reviewers' Recommendations

1. The Department should undertake a thorough review of its own governance processes with an eye to developing a departmental committee structure that will ensure that it can make the most of its complement of faculty members. As a starting point, the Department could look to other similarly sized departments for examples of what such a departmental committee structure might look like. At very least, the Department should have a curriculum/undergraduate committee that would be responsible for proposing changes to undergraduate programs, curriculum planning, and so on – changes and planning that, of course, should then be discussed and voted upon at by the whole Department. In addition to the Associate-Chair Undergraduate, this committee should include at least two other faculty members (not including the Chair), and possibly an Undergraduate student liaison who could attend at least some meetings. Another possibility would be to create a performance evaluation committee that would be responsible for institutionally mandated evaluations of faculty members' performance. And so on. As noted above, other similarly sized departments can provide examples. In all cases, committee memberships should change every few years, and efforts should be made to ensure that different faculty members move in and out of different committees over time.

Program Response

The Anthropology Department welcomes and will undertake the recommended thorough review of its governance processes. This timing of this recommendation works out nicely, because until very recently a significant proportion of the regular faculty in the Department were probationary appointments. But as of July 2020, seven of the eight professors in the Department now have tenure and are now in a good position to devote the necessary time and energy to this exercise. Further, a new Chair will be taking on that role probably next summer, and it would be ideal to have these changes made in time for that transition. Anthropology will therefore undertake a review of current administrative positions (Chair; Associate Chair Undergraduate; Associate Chair Graduate) and formalize, to a greater extent than at present, the roles and authorities of the latter positions, as well as how they are assigned. This will allow the definition and population of a formal departmental committee structure appropriate to a department of this size, to replace current ad hoc committees. Anthropology will follow the reviewers' advice to develop policies to ensure that committee memberships change regularly.

With respect to the recommendation to "create a performance evaluation committee that would be responsible for institutionally mandated evaluations of faculty members' performance", this is seen as a small misunderstanding on the part of the external reviewers since, following the MOA, the Department has voted to use and has used a performance evaluation committee for the past five years. There is thus no need to create such a committee but Anthropology has every intention of continuing to use this procedure.

Dean's Response

I concur; no additional response beyond encouraging the Department in its intention to bring greater formality to its governance processes.

2. The Department should undertake a thorough curriculum review with the assistance of a facilitator. In recent years, the Department has grown in ways and directions that could not have been anticipated at the time of the last curriculum review. Now that things have stabilized, and the Department has an enviable complement of high-achieving researchers and outstanding instructors on hand in full-time and limited-term/sessional positions, the time is right to meet again so as to discuss a number of issues and to propose and prioritize appropriate changes to curriculum and the curriculum planning process. In addition to being a forum for discussing issues raised in the self-study and in this report (concerning first-year courses, on-line courses, and the possibilities presented by co-op students, for example), efforts should be made to ensure that this curriculum review provides the Department's newest faculty members with the opportunity to raise issues of concern and to propose possible changes; having a facilitator run the review would be the best way of ensuring that this happens. This review should also be an occasion for the open discussion of faculty members' own understandings of what a degree in Anthropology from Waterloo offers, or could offer, undergraduate students. Achieving a common vision (however broad) on this last matter could go a long way to promoting the sort of cohesion and consistent messaging that will enable the department to achieve its own great potential while also contributing to Waterloo's larger mission.

Program Response

The Anthropology Department also recognizes the value of this recommendation and will carry it out. For several reasons, it is concluded that the process can best be accomplished in phases, leading up to a final phase where the participation of a facilitator would be helpful. There was clear agreement within the Department about the value of facilitation, but also clear agreement that such facilitated discussions would need to happen in person, which of course will not be possible at least through the Winter 2021 term based on current University guidance regarding Covid-19, and then through the Spring term because some Department members will hopefully be away doing fieldwork. Anthropology therefore proposes to undertake some initial discussions at the sub disciplinary level (e.g., the archaeological

anthropologists would consult together, as would the biological anthropologists, as would the socio-cultural anthropologists) in the Winter 2021 term in order to get this process started. This initial work will be very useful and will help ensure the expeditious success of the facilitator-enabled curriculum review once it becomes feasible, presumably in Fall 2021 or as soon thereafter as possible. The goal in the facilitated process will be to update the undergraduate curriculum to match our understanding of “what a degree in Anthropology from Waterloo offers, or could offer” consistent with the ability of the small complement to offer each course frequently enough that most undergraduate students in the program would have the chance during their time at UW to take most of the Anthropology courses listed in the calendar should they choose to do so.

Dean’s Response

I concur; no additional response beyond agreeing with the Department that most undergraduate students in the Anthropology program should have the chance to take most of the ANTH courses offered.

3. It is clear that a great deal is being expected of the one support staff member employed in the Department. While this staff member appears to be managing this heavy load admirably, she has no backup. Here, it bears noting the truism that keeping a small department running is in many ways no less work, and in some ways much more work, than keeping a large department running. Not knowing what might be possible in the way of relief, we aren’t sure what to recommend – other than that something should be done to alleviate part of the support staff member’s workload in order to ensure that the Department is able to retain this key contributor over the long term.

Program Response

The Anthropology Department agrees with the reviewers’ assessment that the Administrative Manager is required to understand and perform on their own a very large range of tasks in order to support the department and both its undergraduate and Master’s program. Anthropology believes that this workload is not completely unprecedented among the small departments within the Faculty of Arts but would be happy to see the situation altered and will undertake to initiate a review of the position and will consult with the Dean of Arts Office concerning the workload of the Administrative Manager and whether there are options to better support this position.

Dean’s Response

We are aware of the challenges that smaller Departments with a single staff member face. As we move forward with the Faculty’s strategic plan, I am hopeful that we will be able to make some organizational/structural modifications that will alleviate the burden on both faculty and staff in our smaller units.

Implementation Plan

	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing Recommendations
1.	The department should undertake a thorough review of its own governance processes with an eye to developing a departmental committee structure.	The Anthropology department will schedule Faculty meetings devoted to this topic.	Anthropology department Chair; Associate Chair Undergraduate; Associate Chair Graduate.	Fall term 2020; Winter term 2021.
2.	The Anthropology department will schedule Faculty meetings devoted to this topic	The department will begin to explore the issues at the subdisciplinary level, and will prepare for the facilitated review when it becomes feasible to do so.	Anthropology department Chair; Dean of Arts Office and/or CTE (for the facilitator).	Preliminary phase to begin in Winter term 2021, in anticipation of the facilitated process being possible as soon as Fall, 2021.
3.	Something should be done to alleviate part of the support staff member's workload in order to ensure that the department is able to retain this key contributor over the long term.	The department will consult with the Dean of Arts office concerning the workload of the Administrative Manager and whether there are options to better support this position.	Anthropology department Chair; Dean of Arts Office.	Fall term, 2020.

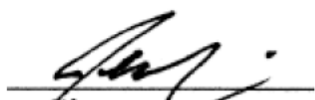
The Department Chair/Director, in consultation with the Dean of the Faculty shall be responsible for the Implementation Plan.

Date of next program review

2026-2027

Date

Signatures of Approval



24 Nov 2021

Chair/Director

Date

AFIW Administrative Dean/Head (*For AFIW programs only*)

Date



March 20, 2022

Faculty Dean

Date


Note: AFIW programs fall under the Faculty of ARTS; however, the Dean does not have fiscal control nor authority over staffing and administration of the program.



1 November 2021

Associate Vice-President, Academic
(For undergraduate and augmented programs)

Date



26 September 2021

Associate Vice-President, Graduate Studies and Postdoctoral Affairs
(For graduate and augmented programs)

Date

Two-Year Progress Report

Anthropology (BA, Minor), Public Issues Anthropology (MA)

January 2022

Background

In accordance with the University of Waterloo's Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response of the Anthropology (BA, Minor) and Public Issues Anthropology (MA) delivered by the Department of Anthropology. A self-study (Volume I, II, III) was submitted to the Associate Vice-President, Academic and Associate Vice-President, Graduate Studies and Postdoctoral Affairs on October 18, 2019. The self-study (Volume I) presented the program descriptions and learning outcomes, an analytical assessment of the programs, including the data collected from a student survey, along with the standard data package prepared by the Office of Institutional Analysis & Planning (IAP). The CVs for each faculty member with a key role in the delivery of the program(s) were included in Volume II of the self-study.

From Volume III, two arm's-length external reviewers were selected by the Associate Vice-President, Academic and Associate Vice-President, Graduate Studies and Postdoctoral Affairs: Dr. Rob Hoppa, Professor of Anthropology, University of Manitoba, and Dr. Andrew Walsh, Associate Professor of Sociocultural Anthropology, Western University.

Reviewers appraised the self-study documentation and conducted a site visit to the University on February 10-11, 2020. An internal reviewer from the University of Waterloo, Dr. Peter van Beek, Professor of Computer Science, was selected to accompany the external reviewers. The visit included interviews with the Vice-President, Academic & Provost; Associate Vice-President, Academic and Associate Vice-President, Graduate Studies and Postdoctoral Affairs; Dean of the Faculty of Arts; Arts Associate Deans of Undergraduate Programs, Graduate Studies, and Research, respectively; Chair and Associate Chairs of the Department of Anthropology, as well as faculty members, staff and current undergraduate and graduate students. The Review Team also had an opportunity to tour the facilities and meet with representatives from the Library.

Following the site visit, the external reviewers submitted a report on their findings, with recommendations. In response, the program responded to each recommendation and outlined a plan for implementation of the recommendations. Finally, the Dean responded to the external reviewers' recommendations, and endorsed the plans outlined by the program. A Final

Assessment Report was submitted that included information from the self-study, the external reviewers’ report, the program response and the Dean’s response.

This **Two-Year Progress Report** draws significantly from the Final Assessment Report. We note that in the month following the site visit, Covid-19 (SARS-CoV-2) was declared a pandemic by the World Health Organization. This has significantly impacted all university activities including those related to the proposed implementation plan developed in response to the recommendations made in the review.

Student Complement (All Years)

	Anthropology				Public Issues Anthropology
	General	Honours	Co-op	Minor	MA
Fall 2021	4	24	12	19	18
Fall 2020	3	26	8	23	20
Fall 2019	6	24	9	19	18
Fall 2018	9	26	6	16	12

*based on Active Students Extract retrieved from Quest January 7, 2022.

Progress on Implementation Plan

A summary of the key findings from the review, along with three main recommendations and responses from both the department and the Dean are provided in the Final Assessment Report. The review recommendations and departmental actions are summarized in the implementation plan table (adapted from the FAR) at the end of this section.

Recommendations

1. **“The Department should undertake a thorough review of its own governance processes with an eye to developing a departmental committee structure that will ensure that it can make the most of its complement of faculty members.** As a starting point, the Department could look to other similarly sized departments for examples of what such a departmental committee structure might look like. At very least, the Department should have a curriculum/undergraduate committee that would be responsible for proposing changes to undergraduate programs, curriculum planning, and so on – changes and planning that, of course, should then be discussed and voted upon at by the whole Department. In addition to the Associate-Chair Undergraduate, this committee should include at least two other faculty members (not including the Chair), and possibly an Undergraduate student liaison who could attend at least some meetings.” (Reviewers’ report)

Status: In progress

Details: We began this process with the generation of a set of documents: 1) The *Anthropology department procedures and practices* document outlines the tasks of administrative positions in the department including, the Chair, Associate Chairs, and the Administrative Manager. This is undergoing revision and is still in draft format. We will add clarification regarding the composition and roles of the new committees (e.g., curriculum) and existing committees (e.g., performance evaluations). 2) A *list/calendar of department administrative tasks* aids in clarifying and anticipating department needs, roles, and expectations. Both of these are living documents that are undergoing continual revision.

Our official proposed action was to “schedule Faculty meetings devoted to this topic”. We still plan to do this, however, faculty meetings and department energy have largely been focused on urgent needs during the pandemic, as described below. We expect to address this directly in late 2022, with completion of the major elements by early 2023, and with planned ongoing modifications and revisions.

2. **“The Department should undertake a thorough curriculum review with the assistance of a facilitator.** In recent years, the Department has grown in ways and directions that could not have been anticipated at the time of the last curriculum review. Now that things have stabilized, and the Department has an enviable complement of high-achieving researchers and outstanding instructors on hand in full-time and limited-term/sessional positions, the time is right to meet again so as to discuss a number of issues and to propose and prioritize appropriate changes to curriculum and the curriculum planning process. In addition to being a forum for discussing issues raised in the self-study and in this report (concerning first-year courses, on-line courses, and the possibilities presented by co-op students, for example), efforts should be made to ensure that this curriculum review provides the Department’s newest faculty members with the opportunity to raise issues of concern and to propose possible changes; having a facilitator run the review would be the best way of ensuring that this happens. This review should also be an occasion for the open discussion of faculty members’ own understandings of what a degree in Anthropology from Waterloo offers, or could offer, undergraduate students. Achieving a common vision (however broad) on this last matter could go a long way to promoting the sort of cohesion and consistent messaging that will enable the department to achieve its own great potential while also contributing to Waterloo’s larger mission.” (Reviewers’ report)

Status: in progress

Details: We have held informal discussions regarding the curriculum amongst the sub disciplinary groups. We feel that the curriculum review will be most productive in person and have been waiting until that is possible again. We currently have scheduled a **curriculum**

retreat for March 4th, 2022 and April 1st, 2022. Both meetings are all day (9:30am-4:30pm) and we have reserved space at the Balsillie School of International Affairs. The first meeting will be for the department only, and the second meeting will include a facilitator from CTE. Prior to March 4th, sub disciplinary groups will hold at least one more discussion to set their curricular priorities and concerns. In the event that the public health situation does not allow for in-person meetings at these times, we have agreed to hold virtual meetings of shorter duration (2-4 hours) on these dates in order to begin the curriculum review process. Should this occur, we will likely need to schedule in-person meetings later in 2022.

3. “It is clear that a great deal is being expected of the one support staff member employed in the Department. While this staff member appears to be managing this heavy load admirably, she has no backup. Here, it bears noting the truism that keeping a small department running is in many ways no less work, and in some ways much more work, than keeping a large department running. Not knowing what might be possible in the way of relief, we aren’t sure what to recommend – other than that **something should be done to alleviate part of the support staff member’s workload in order to ensure that the Department is able to retain this key contributor over the long term.**” (Reviewers’ report)

Status: **in progress**

Details: The *Anthropology department procedures and practices* document, and the *list/calendar of department administrative tasks* detailed above aim to clarify the Administrative Manager’s role and tasks. Our response in the FAR was: “The Anthropology Department agrees with the reviewers’ assessment that the Administrative Manager is required to understand and perform on their own a very large range of tasks in order to support the department and both its undergraduate and Master’s program. Anthropology believes that this workload is not completely unprecedented among the small departments within the Faculty of Arts but would be happy to see the situation altered and will undertake to initiate a review of the position and will consult with the Dean of Arts Office concerning the workload of the Administrative Manager and whether there are options to better support this position.”

The Dean of Arts office is aware of this concern regarding the workload of staff in smaller departments across the Faculty of Arts. We will continue to work with the Dean’s office in addressing structural and/or organizational changes that can ameliorate this issue. This is a long-term ongoing issue that is largely out of the hands of the department, but we will continue to address it in our conversations with the Dean’s Office. We will revisit this directly with the Dean in Spring term, 2022.

Circumstances that have altered the original implementation plan

The original implementation plan has been delayed due to challenges associated with the Covid-19 pandemic. Faculty, staff, and students have been required to make many adjustments with the shift to online teaching and learning, and work from home rules. New programs, platforms and tools, along with new regulations, needed to be learned and implemented very quickly. Repeated moves between in-person and online teaching (including multiple last-minute shifts in delivery modes) have resulted in significantly elevated workloads. Several faculty and staff members with school-aged children faced additional challenges posed by school closures.

In addition, the department faced multiple leadership changes during the period of the review with one Chair overseeing the preparation of the self-review (Volumes I and II), an Acting and then Interim Chair overseeing the preparation of the FAR, and a new Chair overseeing the preparation of this Two-Year Progress Report. This required a new appointment in the role of Associate Chair of Graduate Studies. We also were challenged by the secondment/cross-appointment of one tenured faculty member to another department resulting in the loss of their service responsibilities to the department, and a one-term medical leave for a faculty member.

Updated Implementation Plan

	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing Recommendations
1.	The department should undertake a thorough review of its own governance processes with an eye to developing a departmental committee structure.	The Anthropology department will schedule Faculty meetings devoted to this topic, and will continue to refine the <i>department procedures and practices</i> and the <i>list/calendar of department administrative tasks</i> documents.	Anthropology department Chair; Associate Chair Undergraduate; Associate Chair Graduate.	Fall term 2022. Completion of major elements in Winter 2023. Revisions ongoing.
2.	The Department should undertake a thorough curriculum review with the assistance of a facilitator.	The department will continue to explore the issues at the sub disciplinary level, and will prepare for the facilitated review when it becomes feasible to do so. Curriculum review is currently scheduled for March 4 (department only) and April 1 (with facilitator), 2022.	Anthropology department Chair; Dean of Arts Office and/or CTE (for the facilitator).	Winter term, 2022
3.	Something should be done to alleviate part of the support staff member's workload	The department will consult with the Dean of Arts office concerning the workload of the Administrative Manager and whether there are options to better support this position.	Anthropology department Chair; Dean of Arts Office.	Spring term, 2022 and ongoing

The Department Chair/Director, in consultation with the Dean of the Faculty shall be responsible for monitoring the Implementation Plan.

Date of next program review: 2026 - 2027
Date

Signatures of Approval:



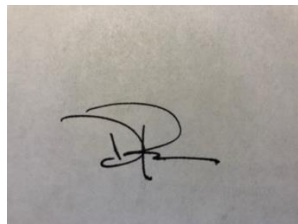
10 January 2022

Chair/Director

Date

AFIW Administrative Dean/Head (For AFIW programs only)

Date



17/viii/22

Faculty Dean

Date

Note: AFIW programs fall under the Faculty of ARTS; however, the Dean does not have fiscal control nor authority over staffing and administration of the program.



10 June 2022

Associate Vice-President, Academic
(For undergraduate and augmented programs)

Date



Jeffrey M. Caelli

17 May 2022

Associate Vice-President, Graduate Studies and Postdoctoral Affairs
(For graduate and augmented programs)

Date

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University of Waterloo
SENATE LONG RANGE PLANNING COMMITTEE
Report to Senate
21 November 2022

Senate Long Range Planning Committee (the “Committee”) met on 27 October 2022 agreed, in accordance with [Senate Bylaw 2](#) (section 3.04b), to forward the following item to Senate for information.

Further details are available at: <https://uwaterloo.ca/secretariat/committees-and-councils/long-range-planning-committee>

FOR INFORMATION

1. TEACHING INNOVATION INCUBATOR

The Committee received an update on the status of the Teaching Innovation Incubator (TII) project from David DeVidi, Associate Vice-President, Academic, Robert Gorbet, Chair of Knowledge Integration and Donna Ellis, Director, Centre for Teaching Excellence.

The Committee discussed the following:

- Faculty representation on the TII Project Team;
- How TII projects may be similar to or different from the existing innovation practices within the faculties;
- TII’s approach to supporting innovation;
- The role of an incubator’s role relative to developing interdisciplinary curriculum; and
- Pursuit of innovation and deep understanding of various barriers at the faculty level.

2. SPACE INVENTORY & DEFERRED MAINTENANCE

The Committee received an update from Stepanka Elias, Executive Director, Facilities on Space Ownership and Deferred Maintenance at the University.

In particular, the Committee discussed:

- How space is categorized across and between institutions;
- Deferred maintenance at the main campus and satellite campuses;
- How deferred maintenance is budgeted;
- Means by which sustainable renovations have been funded at other institutions;
- Projected expenses for continuing to defer maintenance;
- Reallocation of existing resources in order to fund deferred maintenance; and
- Considerations for student housing renewal and housing master plan.

/swt

Vivek Goel
President and Vice Chancellor

for

James Rush
Vice-President, Academic and Provost

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Vice-President, Research & International Report to Senate November 2022

Introduction

This report to Senate highlights successful research outputs and outcomes for the period September - October 2022 by the thematic areas as outlined in Waterloo's Strategic Plan 2020-25.

ADVANCING RESEARCH FOR GLOBAL IMPACT

R1 - Research strengths to solve real-world problems

Awards and Distinctions

Carl Haas (Civil and Environmental Engineering) - 2022 Fellow, Royal Society of Canada

Dr. Haas has contributed seminal new knowledge in the principles behind the interdependencies among and the circular economic applications of computer vision, mixed reality, building information modeling and human-robotic-systems. His contributions improve complex, built environment systems' performance.

Marie-Claire Cordonier Segger (School of Environment, Enterprise and Development) - 2022 Fellow, Royal Society of Canada

Dr. Segger is a pioneering professor and renowned jurist in sustainable development law and governance, advancing solutions to climate change, natural resources degradation and other critical global sustainability challenges while interactionally informing UN treaty design and compliance.

Randy Allen Harris (English Language and Literature) - 2022 Fellow, Royal Society

Dr. Harris researches the intersection of rhetoric, linguistics, cognitive neuroscience, and Artificial Intelligence at the University of Waterloo, where he is a Professor of English Language and Literature and Director of the multinational, multisectoral, and multidisciplinary research project, the Rhetoricon Database.

Aiping Yu (Chemical Engineering) - Rutherford Memorial Medal in Chemistry - Royal Society of Canada

- The medals are awarded for outstanding research during the formative stage of a career in any branch of physics and chemistry and in recognition of Lord Rutherford's own research carried out in Canada at a relatively young age.

Pengfei Li Won (Statistics and Actuarial Science) - 2022 Centre de recherches mathématiques and the Statistical Society of Canada (CRM-SSC) Prize, Statistical Society of Canada

- This award recognizes a statistical scientist's excellence and accomplishments in research during their first 15 years after earning his/her doctorate (or equivalent degree). It is awarded annually by the Centre de recherches mathématiques (CRM) and the Statistical Society of Canada (SSC) and is widely viewed as the most prestigious honour for mid-career researchers in the field of statistics in Canada.

Kevin Costello (adjunct Physics and Astronomy - Perimeter Institute) - John L. Synge Award - Royal Society of Canada

- The award is given for outstanding research in any of the branches of the mathematical sciences.

Zhongchao (Chao) Tan (Mechanical and Mechatronics Engineering) – 2022 Canadian Society of Mechanical Engineering (CSME) Fellow

- Founded in 1970, CSME works to advance the quality and scope of mechanical engineering in Canada and this award recognizes Tan for his significant contributions to the field of mechanical engineering.

Ron Schlegel (RIA) - Canadian Academy of Health Sciences (CAHS) Fellow

- Ron Schlegel, a former Health Studies professor, is one of two new Fellows of the CAHS elected from the University of Waterloo. CAHS brings together Canada's top-ranked health and biomedical scientists and scholars to make a positive impact on the urgent health concerns of Canadians.

Scott Walbridge (Civil and Environmental Engineering) - Engineering, H.A. Krentz Research Award, Canadian Institute of Steel Construction (CISC)

- Dr. Scott Walbridge has received a top award for a research proposal titled *Fatigue & Fracture Toughness of Steel Wire-Arc Additively Manufactured Structural Products* that has the potential to transform the civil infrastructure industry. The Canadian Institute of Steel Construction's (CISC) H.A. Krentz Research Award recognizes researchers with the year's best research proposal. Walbridge is the first Waterloo professor to ever receive this award.

Sivabal Sivaloganathan (Applied Mathematics) - Fellow of the Society for Mathematical Biology

- The Society for Mathematical Biology Fellows Program honors members of the Society who are recognized by the scientific and scholarly community as distinguished for their contributions to the discipline.

Joanne Atlee (Cheriton School of Computer Science) - Distinguished Service Award, Association for Machinery SIGSOFT

- Joanne Atlee, Director of Women in Computer Science, has received the 2022 Association for Computing Machinery (ACM) SIGSOFT Distinguished Service Award, an honour bestowed for her sustained and outstanding service to the software engineering community and for enabling an equitable, diverse, and inclusive research environment in software engineering worldwide.

Don Cowan (Computer Science) - J.W. Graham Medal in Innovation and Computing

- The J.W. Graham Medal in Computing & Innovation was created in 1994 to recognize the leadership and many innovative contributions made to the University of Waterloo, and to the Canadian computer industry by J. Wesley Graham, during his career as both a professor and university administrator.

Stacey Watson (Computer Science) - Paper Award, MobileHCI 2022

- Cheriton School of Computer Science Professor Stacey Watson, and her colleagues from the Institute of Technology, have received a best paper award at MobileHCI 2022.

Faculty of Health Graduate Mentorship Awards

This award, established in 2020, acknowledges and rewards faculty members who have made a significant impact in the mentorship of graduate students in their research and professional endeavours. The following are the recipients of the 2021 award:

- **Kim Lopez** (Recreation and Leisure Studies) - Emerging Graduate Mentorship Award
- **Mark Ferro** (School of Public Health Sciences) - Mid-Career Graduate Mentorship Award
- **John Hirdes** (School of Public Health Sciences) - Senior Mentorship Award

R3 - Leveraging partnerships for research impact

Norman Zhou (Mechanical and Mechatronics Engineering) - [NSERC 2021 Synergy Award for Innovation - Two or more Companies, \\$200,000](#)

Dr. Zhou has been chosen as a winner of the 2021 Synergy Awards for Innovation in the Category Partnership for a proposal entitled: *From a Local Partnership to an International Collaboration: Leading Innovation in Automotive Steel Welding*, with *Huys Industries Limited, International Zinc Association, ArcelorMittal Dofasco G.P.*

- Partners: Huys Industries, ArcelorMittal Dofasco, International Zinc Association

NSERC Alliance

These grants support research projects led by strong, complementary, collaborative teams that will generate new knowledge and accelerate the application of research results to create benefits for Canada.

1. **Bruce MacVicar** (Civil Engineering), *Buildings and floods: Micro-Scale Flood Risk Assessment in Cities*, **\$1,095,150 over 5 years**
2. **Scott Hopkins** (Chemistry), *Detecting and Treating Per- and Polyfluoroalkyl Substances (PFAS) in Canadian Water Systems*, **\$1,350,000 over 5 years**
3. **Merrin Macrae** (Geography and Environmental Management), *Optimizing Phosphorus 4R Nutrient Stewardship for water quality protection in Canadian Cropping Systems*, **\$1,181,817 over 5 years**
4. **Nandita Basu** (Civil Engineering), *From Data to Knowledge: Designing User-Driven Nutrient Loading Observatories across the Great Lakes Basin*, **\$352,000 over 3 years**
5. **Sibel Alumur Alev** (Management sciences), *Designing of Optimal E-Commerce Networks with Autonomous Airplanes to Serve Remote Communities*, **\$75,000 over 3 years**
6. **Elliot Biro** (Mechanical and Mechatronics Engineering) Mitacs, *Characterizing and Optimizing Bondline Reactions during Electric Resistance Welding of Advanced High Strength Steels*, **\$120,000 over 2 years**
7. **Serhiy Yarusevych** (Mechanical and Mechatronics Engineering), *Analysis of production and spread of aerosolized pathogens: toward quantitative distancing, occupancy, and ventilation guidelines for work and public places*, **\$292,000 over 4 years**
8. **Fatma Gzara**, *Multi-layered network and routing optimization for unmanned aerial vehicle traffic*, **\$74,344 over 2 years**

Waterloo International Engagements

- September 2, 2022: Representatives from Waterloo International, Waterloo AI and IQC, met with the **Canadian Embassy in Japan's Senior Trade Commissioner**, Lesley Ann Reed and **Global Affairs Canada's Trade Commissioner** and Head of Office, Janice Vogtle to discuss current and future relationships with Japan.
- September 9, 2022: Waterloo International along with Work Integrated Learning and the Accelerator Centre discussed global collaboration and future partnerships with representatives from **Tohoku University, the University of Tokyo and the Japan External Trade Organization**.

- September 11-16, 2022, WI's International Relations manager, Eric Jardin, participated in the **EuroTech Partner Days** (a collaboration of six key universities: **Technical University of Denmark, Ecole Polytechnique Fédérale de Lausanne, Ecole Polytechnique, Technion, Technical University of Eindhoven** and **Technical University of Munich**) and the **European Association for International Education 2022 Conference** where he met with key partners to discuss ongoing collaboration and future opportunities.
- September 26, 2022: Waterloo International hosted delegates from the **British High Commission in Ottawa** and the **British Consulate-General in Toronto**. The visit reviewed and celebrated many of the connections between researchers, universities, innovators, and others based in the **United Kingdom** and those based at the University of Waterloo. Representatives from Institute for Quantum Computing (IQC), Waterloo Climate Institute and the Waterloo Institute for Sustainable Energy (WISE) all participated in parts of the visit.

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University of Waterloo
REPORT TO SENATE FROM THE FACULTIES
21 November 2022

FOR INFORMATION

The Faculty Reports for Senators' information regarding the variety of appointments, reappointments, special appointments, leaves, and other matters of interest about individuals in the Faculties are available at the [Senate agenda page](#)¹.

¹<https://uwaterloo.ca/secretariat/sites/default/files/uploads/documents/all-faculties-november.pdf>