University of Waterloo
SENATE
Notice of Meeting

Date: Monday 20 November 2017
Time: 3:30 p.m.
Place: Needles Hall, room 3407

	OPEN SESSION	
3:30	**Consent Agenda** **Motion:** To approve or receive for information by consent items 2-4 below.	
	1. Minutes of the 16 October 2017 Meeting	Decision
	2. Reports from Committees and Councils	
	a. Executive Committee	Information
	b. Graduate & Research Council	Information
	c. Undergraduate Council	Decision/Information
	3. Report of the President	
	a. Recognition and Commendation	Information
	4. Reports from the Faculties	Information
	Regular Agenda	
3:35	5. Business Arising from the Minutes	Information
3:45	6. Teaching Presentation – Kelly Grindrod, School of Pharmacy	Information
	7. Reports from Committees and Councils	
4:00	a. Executive Committee	First Reading
4:05	b. Graduate & Research Council	Decision
4:15	c. Undergraduate Council	Decision
4:25	d. University Committee on Student Appeals	Information
4:35	8. Report of the President	Information
4:50	9. Q&A Period with the President	Information
5:00	10. Report of the Vice-President, Academic & Provost	Information
5:10	11. Report of the Vice-President, University Research	Information
5:20	12. Other Business	
	CONFIDENTIAL SESSION	
5:25	13. Minutes of the 16 October 2017 Meeting	Decision
5:30	14. Business Arising from the Minutes	
5:35	15. Other Business	

6 November 2017
KJJ/ees

Karen Jack
University Secretary
Secretary to Senate

University of Waterloo
SENATE
Minutes of the Monday 16 October 2017 Meeting

Present: Bilal Akhtar, Michael Balogh, Sandra Banks, Katherine Bergman, Antonio Brieva, Robert Bruce, Carmen Bruni, Kofi Campbell, Claudio Canizares, Jeff Casello, Jennifer Clapp, Tara Collington, Mario Coniglio, Simon Courtenay, Eric Croiset, Shannon Dea, Charmaine Dean, David DeVidi, George Dixon, Bernard Duncker, David Edwards, Marlene Epp, Mavis Fenn, Paul Fieguth, Wendy Fletcher, Cindy Forbes, George Freeman, Shikha Gandhi**, Matthew Gerrits, Mark Giesbrecht, Julia Goyal, Craig Hardiman, Feridun Hamdullahpur (chair), Dennis Huber, Karen Jack (secretary), Craig Janes, Spiro Karigiannis, Karim Karim, Scott Kline, Alysia Kolentsis, Robert Lemieux, Mungo Marsden, Katie Misener, Grant Mitchell, Richard Myers, Cathy Newell Kelly, Daniel O'Connor, Diana Parry, Douglas Peers, Angela Pereira**, David Perrin, William Pristanski**, Bruce Richter, James Rush, Beth Sandore Namachchivaya, Mark Seasons, Marcus Shantz, Samantha Shortall, Joanne Shoveller, James Skidmore, Richard Staines, Gordon Stubley, Pearl Sullivan, Hamid Tizhoosh, Bryan Tolson, Tomson Tran, Johanna Wandel, Stephen Watt, Dan Wolczuk, Alexander Wray, En-Hui Yang

Guests: Bruce Campbell, Aldo Caputo, Amanda Cook, Donna Ellis, Mike Grivicic, Peggy Jarvie, Ross Johnston, Jennifer Kieffer, Derek Madge, Chris Read, Emily Schroeder, Daniela Seskar-Hencic, Jay Shah**, Allan Starr, Mathew Thijssen, Glen Weppler

Absent: Jean Andrey*, Chris Bauch*, Hannah Beckett*, Anne Bordeleau*, Jeffrey Bunn, Brian Cepuran, Andrew Clubine, Tia Driver, Fraser Easton*, Robert Gorbet*, Thorsten Heins, Marios Ioannidis, Tom Jenkins*, Beth Jewkes*, Greta Kroeker*, Barb Moffatt*, Mohammad Nasif*, David Porreca*, Christopher Pugh*, Neil Randall*, Ross Willard*

*regrets
**joined by telephone

The chair welcomed Marcus Shantz, president of Conrad Grebel University College, and Beth Sandore Namachchivaya, university librarian, to their first meetings of Senate and noted that the biographies of the honorands at this month's convocation ceremonies and a strategic plan update were at members' places.

OPEN SESSION

Consent Agenda

Senate heard a motion to approve or receive for information the items on the consent agenda, being items 1-5 below.

Dea and DeVidi.

1. MINUTES OF THE 18 SEPTEMBER 2017 MEETING
Senate approved the minutes of the meeting.

2. REPORTS FROM COMMITTEES AND COUNCILS
Graduate & Research Council. Senate received the report for information.

Undergraduate Council
Faculty of Arts, English Language Proficiency. Senate approved the inactivation of the Faculty of Arts' existing English Language Proficiency Requirement and the removal of the calendar text as described in the report, effective 1 September 2018.

Arts Degree Requirements. Senate approved the new Communication Skills Requirement for the Faculty of Arts as described in the report and effective 1 September 2018.

Faculty of Science, English Language Proficiency. Senate approved the inactivation of the Faculty of Science's existing English Language Proficiency Requirement and the removal of the calendar text as described in the report, effective 1 September 2018. Senate also approved the new Communication Requirement for the Faculty of Science as described in the report and effective 1 September 2018.

Senate received the remainder of the report for information.

3. REPORT OF THE PRESIDENT
Recognition and Commendation. Senate received the report for information.

4. REPORTS FROM THE FACULTIES
Senate received the reports for information.

5. COMMITTEE APPOINTMENT
Senate approved the appointment of Marcus Shantz as the faculty member of Senate from the affiliated and federated institutions of Waterloo on the Senate Nominating Committee for Honorary Degrees, term to 30 April 2018.

The question was called, and the motion carried unanimously.

Regular Agenda

6. BUSINESS ARISING FROM THE MINUTES
Course Evaluation Project Follow-Up. Dixon advised members that the membership of the committee tasked with phase II responsibilities is being worked on, as is allocating sufficient resources. Members heard that this new committee will meet with the first committee to inform its work. The chair invited Dea to speak to the motion she raised at the last meeting, which she did. Dea suggested that a range of options that are complementary to the student course perception survey tool is needed. Members heard a motion to strike a working group to research and develop methods of assessing teaching and learning complementary to student course perception surveys.

Dea and Wray.

In discussion: several members expressed support for the initiative, and a few members indicated that they were not in favour. The vote was called and the motion carried. Members understood that Coniglio and Dixon will consult with the Faculty Relations Committee before initiating the working group.

Undergraduate Council Follow-Up. Coniglio directed members to the handout at their places which addressed the questions raised at the last meeting. Following confirmation that the early publishing of 2018 information was a mistake, Coniglio thanked Senate for its thoroughness.

7. TEACHING PRESENTATION – MARCEL O'GORMAN, DIRECTOR OF CRITICAL MEDIA LAB, ENGLISH LANGUAGE AND LITERATURE
Professor O'Gorman was introduced by Peers. O'Gorman spoke to Senate about the subject of "digital abstinence", including how the concept is not limited to the fringes and indeed is relevant in mainstream thought. He spoke to work being done in the Experimental Digital Media laboratory within his department, and highlighted the work of his students.

In discussion: the challenges of measuring "attention"; he focusses on the distractions of handheld devices, not laptops; the tangible benefits of helping students pay attention. A round of applause followed.

8. REPORTS FROM COMMITTEES AND COUNCILS

Graduate & Research Council
Senate heard motions to the following effects:

Faculty of Arts, History. To approve the modification of the PhD program in History, as of January 2018, as presented the attachment.

Casello and Peers. Carried unanimously.

Faculty of Arts, Psychology. To approve the modification of the Master of Arts program in Psychology, as of January 2018, as presented in the attachment.

Casello and Peers. Carried unanimously.

Undergraduate Council
Senate heard motions to the following effects:

Faculty of Science, Materials and Nanoscience. To approve changes to the honours materials and nanosciences (joint with chemistry) plan effective 1 September 2018 and to approve changes to the honours co-operative materials and nanosciences (joint with chemistry) plan effective 1 September 2018.

Coniglio and Lemieux. Carried unanimously.

Associate Vice-President, Academic – Global Experience Certificate. To approve the removal of the requirement for completion of three online modules, and to remove the $100 withdrawal fee, both effective immediately, and to approve a research, assessment and recommendation process for the certificate to be completed by Fall 2018 to consider revisions to the certificate plan.

Coniglio and Richter. Carried unanimously.

9. REPORT OF THE PRESIDENT

Hamdullahpur reported on a number of items, including: recent Maclean's rankings; offering thanks to the deans for their inspired costumes and for raising awareness for the United Way campaign; an update on activities with government; the recently finalized strategic mandate agreement and advice that it will be posted online once it receives government approval.

Environmental Sustainability Strategy Presentation. Mathew Thijssen, sustainability coordinator, presented regarding strategy, progress, goals, and foundational actions. Following appreciation by the chair for the group's work, in response to questions, Thijssen asked members to help raise awareness and he and Huber indicated that while there is a modest budget, it would not sustain a full research program, and any interested researchers should feel free to reach out if they would like to become involved.

Strategic Plan 2013-2018 – Fall 2017 Update. Hamdullahpur invited Dixon to present the annual strategic plan update. Dixon spoke to the materials at members' places and indicated: his focus is on key issues; the next step will be a summative report in 2018; the University's commitment to follow-up on the plan is commendable**.**

10. Q&A PERIOD WITH THE PRESIDENT

In response to questions on the strategic plan update, the chair advised that the two-year break between the current plan and the next is to allow time to coalesce activities and initiatives between the plans. In response to other questions, the chair and Dixon confirmed that ensuring student satisfaction is a key priority; Waterloo's student retention rates are the fourth highest in Canada; retention is top of mind and improvements on several fronts have helped. Requests were made to consider bringing retention data to a future meeting, as well as data relating to co-op employer turnover rates.

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

a. Sexual Violence Response Coordinator Presentation. Amanda Cook, sexual violence response coordinator, presented an update to Senate on her role and responsibilities. There were no questions.

b. Degrees, Diplomas and Certificates. Senate heard a motion to approve the lists of candidates for degrees, diplomas and certificates as recommended by the Faculty councils and the associate vice-president, graduate studies and postdoctoral affairs, and to authorize the chair, on behalf of Senate, to add to or change the lists of candidates for degrees, diplomas and certificates as approved at this meeting, provided that such additions or changes are based on the recommendation of the registrar or (in the case of graduate students) the associate vice-president, graduate studies and postdoctoral affairs, and provided that the chair report back to Senate to advise of any such additions or changes.

Dixon and Newell Kelly. Carried unanimously.

12. REPORT OF THE VICE-PRESIDENT, UNIVERSITY RESEARCH

Dean provided members with a brief report on activities and members received her written report for information.

13. OTHER BUSINESS

There was no other business.

Senate convened in confidential session. Glen Weppler, director of housing & residences, was invited to stay for confidential session.

12 November 2017

Karen Jack
University Secretary
Secretary to Senate

CONFIDENTIAL SESSION

The confidential minutes have been removed.

University of Waterloo
SENATE EXECUTIVE COMMITTEE
Report to Senate
20 November 2017

The Senate Executive Committee met on 6 November 2017 and agreed to forward the following item to Senate for information.

FOR INFORMATION

December Meeting of Senate
Although there currently appears to be insufficient agenda to warrant a December meeting, the committee will hold its December meeting date and advise Senate to do likewise. The secretary will advise the Executive Committee within a week of its December meeting whether a meeting is warranted and Senate will be so advised. [Process instituted by the Executive Committee in November 2006.]

6 November 2017

Karen Jack
University Secretary
Secretary to the Committee

University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
Report to Senate
20 November 2017

Senate Graduate & Research Council met on 16 October 2017, and on behalf of Senate approved curricular submissions, graduate awards and one final assessment report. Council agreed to forward these items to Senate for information. Council recommends that these items be included in 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, new courses, course revisions, course inactivations, and four minor program revisions were approved for the Faculties of environment (geography and environmental management, School of Environment, Enterprise and Development, School of Environment, Resources and Sustainability) and mathematics (actuarial science, pure mathematics).

GRADUATE AWARDS

On behalf of Senate, council approved the Huawei Prize for the Best Research Paper by a Mathematics Graduate Student, the Manulife Indonesia READI Training Award, the Master of Business, Entrepreneurship and Technology (MBET) Scholarship, and the Graduate Student Medical Leave Award.

ACADEMIC PROGRAM REVIEW REPORTS

a. Final Assessment Report – Combinatorics and Optimization (MMath/PhD) [Attachment #1]

/ar

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

Charmaine Dean
Vice President, University Research

Final Assessment Report
Combinatorics and Optimization (MMath/PhD)
May 2016

Summary of the Program Review:

In accordance with the University Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response and assessments of the programs (MMATH, PhD) delivered by the Department of Combinatorics and Optimization (C&O). OCGS reviews were last conducted in 2002 and 2009 and these two programs were classified as of good quality.

A final self-study (Volume I) was submitted to the Associate Provost, Graduate Studies Office on July 2016. The self-study presented the program descriptions and learning outcomes and an analytical assessment of these two programs. Data included in the report was prepared by the Office of Institutional Analysis & Planning (IAP), the Library and the Cooperative Education and Centre for Career Action (CECA), and CVs (Volume II) for each full-time faculty member in the program were also provided.

Two arm's-length external reviewers (Volume III), Daniel Bienstock, Professor in the Department of Industrial Engineering and Operations Research from Columbia University, and Nantel Bergeron, Professor in the Department of Mathematics and Statistics at York University were ranked and selected by the Associate Provost, Graduate Studies, in addition to one internal reviewer: Professor Corey Johnson, from the Department of Recreation and Leisure Studies.

They reviewed the self-study documentation and then conducted a site visit to the University on March 2-3, 2016. The visit included interviews with the Provost (Academic); Associate Provost, Graduate Studies; Dean of the Faculty; Faculty Associate Dean of Graduate Studies, Chair and Graduate Chair of the Department, Faculty Members from the six research fields in the program, as well as staff and the majority of current graduate students. The reviewers also had an opportunity to visit the programs facilities.

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

Program characteristics:
The Department of Combinatorics and Optimization (C&O) was founded in 1967, and is one of five departments in the Faculty of Mathematics. Since their inception, C&O has been offering the following graduate degrees: MMath (Master of Mathematics); and PhD (Doctor of Philosophy).

The Department of Combinatorics and Optimization was the first department of its kind in the world. To this day it remains the department with the largest combined concentration of faculty and researchers in its six fields of expertise: Algebraic Combinatorics; Continuous Optimization; Cryptography; Discrete Optimization; Graph Theory; and Quantum Computing.

MMath (Master of Mathematics)
Admission to the MMath program normally requires the equivalent of a Canadian Honours Bachelors Degree in Mathematics with at least a B+ average, and in practice seldom admits a student with less than an A average.

The following Masters programs are offered:
1. Accelerated Masters Program
2. Master of Mathematics (MMath):
    (a) Thesis Option, (b) Research Paper Option, (c) Co-op Option
3. Master of Mathematics in Combinatorics and Optimization (Quantum Information):
    (a) Thesis Option, (b) Co-op Option

The Masters program serves students with a variety of motivations: some are interested in study and intellectual growth beyond the level of the Bachelor's degree, whereas others enter the program seeking advanced or specialized knowledge to expand their range of career opportunities. Still other students are preparing for admission to a PhD program.

PhD (Doctor of Philosophy)
Admission to the PhD program normally requires the equivalent of a MMath Degree with an A average, background in combinatorics or optimization, and strong potential for research success. The degree requirements include graduate course work, a two-stage Comprehensive Examination, a doctoral thesis, and a lecturing requirement.

The following Doctorate programs are offered:
Doctor of Philosophy (PhD)
Doctor of Philosophy in Combinatorics and Optimization (Quantum Information)

The PhD program aims to give students the knowledge and research experience they need to build successful careers in academic or research positions.

Summary of strengths, challenges and weaknesses based on self-study:

Strengths

- Recognized as a high quality graduate program
- Very unique in its constitution and attracts strong researchers and students
- The program has an exceptional reputation among researchers at the intersection of classical discrete mathematics and classical ("hard") optimization, with a strong mathematics orientation
- The program compares well with programs at Georgia Tech, Carnegie Mellon University and MIT
- No other institution quite encompasses the same strength and diversity in the fields offered by C&O

Challenges

- Faculty recruitment: competition for the top researchers is fierce. The department was unsuccessful at filling faculty positions in 2014 and 2015.

- Faculty retention: in the past fifteen years, a number of C&O faculty members have resigned to take up positions at other prestigious institutions.

- Gender balance: females are underrepresented in faculty and graduate student numbers.

- Graduate student recruitment: competition is especially fierce with top US universities. Furthermore, the proportion of domestic graduate students has been steadily decreasing - this parallels similar phenomena at US universities.

- Graduate student funding: NSERC discovery grants are insufficient to provide competitive compensation packages to attract top international graduate students. The grant levels are especially low in mathematics (compared to computer science and engineering), and there are very few alternative sources of funding for faculty members working in pure areas of mathematics.

Weaknesses

- Communication: seems to be a recurring theme between the various groups at the university. From students wanting better information about their requirements and options; to staff members wanting more transparency about budget and regulation; to department administrators desiring better communication regarding admission. The information gap was particularly noted by reviewers with regards to international Masters' students funding.

- Flexibility: some students expressed the desire for more flexibility in the available options for their degree. Students with a stronger mathematical background would like to have increased access to the other mathematics departments for their choices of courses and qualifying exams

- Masters' Advising: it was noted by Masters' students that the pairing of student/advisor is not always ideal. They expressed the desire to have one or two more strategic meetings directly with the Graduate Chair to address any issues that may arise

Summary of key findings from the external reviewers:
The programs were reviewed by OCGS in 2002 and 2009 and were given the classification of good quality – which the reviewers agreed is still accurate. Reviewers concluded that Combinatorics & Optimizations is a very high quality graduate program and that the department is very unique in its constitution and attracts strong researchers and students. Moreover, the program has an exceptional reputation among researchers at the intersection of classical discrete mathematics and classical ("hard") optimization, with a strong mathematics orientation. Reviewers strongly urged that this attribute not be harmed by changing the mission of the department or by pursuing hot topics of temporary interest.

In sum, the reviewers did not find any major issues with these programs, but offered minor recommendations.

Program response to external reviewer recommendations:

1. **Faculty recruitment:** The quality of the department correlates directly with the quality of its faculty. It is thus very important to always recruit the best possible candidates. The department has the good practice to keep the search as open as possible in order to attract the top candidate. We indeed encourage that practice. In some research groups it might be appropriate to have a more aggressive search. Therefore we recommend that some of the research group promote a more active, focused search.

   Response
   Faculty recruitment was identified as a high priority in C&O, and the department has been able to consistently hire strong candidates. C&O has also been highly successful in obtaining recognition for its faculty members such as Early Researcher Awards. At the level at which the department is competing for talent, the competition is very strong. One way the department circumnavigates this is by entertaining applications from as wide a range of areas as possible. When C&O has a need for someone in a certain area, department

members in that specialization are called to help attract applications from the strongest candidates they can find. Hence, the program feels they already employ the reviewer's recommendation on this topic.

2. **Faculty retention**: In most cases the department views as the loss of some good members as a necessary corollary of the strength of the department: if you hire the best people, then you expose yourself to poaching by other universities. This probably indeed explains most of the losses. But it would not hurt to also have a proactive view, and try to minimize this issue. To develop a sense of community, it may help to promote increased cross-pollination between the various institutions in the area, for example the Fields Institute.

   Response
   The number of resignations in C&O since 2006 is eight faculty rather than ten. While exit interviews are not common practice in this program, the department feels that the reasons for past departures had been adequately communicated. To verify this, faculty members that left since 2006 were contacted, and five responses were received. In sum, most individuals left to become a distinguished chair in their home countries, whereas the others left to either accommodate their spouse's career and/or family needs. Given the high caliber of faculty, the turnover rate is not unexpected as these are people who can move if they choose. A consequence of the departure of these people is that C&O has to regularly hire new people, which has resulted in a faculty age profile that is quite uniform. C&O does not see that increased connections with the Fields Institute will have any impact as Toronto is at an inconvenient distance, yet C&O has many visitors to the department and does not feel isolated.

3. **Gender balance**: We do not have much more to propose here. It is felt that real changes in the STEM imbalance of genders would require work to be done at a much younger age of development. The department still has to work as hard as possible to create an appropriate model for increasing diversity among young hires -- but not at the cost of quality.

   Response
   The proportion of strong female candidates in the applicant pool is often small, and this is despite the fact that the department actively encourages female applications. For example, in the 2015/2016 hiring round, there was a total of approximately 50 applicants that merited serious consideration, only six of which were women. C&O consistently makes strong efforts to attract good female candidates, and has offered positions to female candidates multiple times during the last 5 years alone. This has lead to the hiring of Karen Yeats most recently, in the 2015/2016 hiring round.

4. **Graduate student recruitment**: In the current demographic, there are not enough good domestic recruits to feed the vitality of the department. This is especially true in mathematics in general, and C&O must turn to international students as well to complement their strength. At the university of Waterloo, the proportion of International graduate students is 38%; in the C&O department it is 55%. This is not surprising for us and in fact we strongly recommend that the University continue to support this disparity. Reducing the proportion of international students would affect significantly the quality of the department.

   In such competitive environment, it is very important that the files of candidates be process as quickly as possible. During our visit we where given the assurance that this will be the case in future recruitment periods. We have two small suggestions that may help increase the successful recruitment of the best graduate students.

   a. Fly-in the best potential international candidate for a short visit of the University.
   b. Send faculty to recruit first hand in strategic area in the USA (Boston, San Francisco, etc)

   Response
   The intake of graduate students in C&O varies significantly from year to year quite unpredictably. It seems clear that the department's current number of students is very close to the maximum number it can handle, being constrained by upper bounds on the financial support available and by the number of supervisors (with the latter more important). The department does fly in potential graduate students from the US each year, and will continue to do so. They also arrange skype interviews with students from outside North America, and will consider bringing some in for a campus visit. C&O makes offers to strong students as quickly as possible, which they have found impresses the applicants. The program also encourages the active involvement of their faculty in recruiting strong students, via skype calls and through contact at conferences and research visits.

5. **Graduate student funding**: This might be the greatest challenge of the department. As mentioned above, it is important for C&O department to have a higher proportion of international students. But the opportunities to fund such students are much less than domestic students and the burden then rely on PI grants. In some research groups, NSERC grants are insufficient to support the number of international students. Thus far the department has been creative in their budget to allow the funding of the best international students in all research groups. It is vital that this practice continue. It is our understanding that the new budget model of the university will serve well the faculty of mathematics. We strongly recommend that with the new model a fair proportion of the budget be allocated

to the funding of international graduate students. The strong international reputation of the departments relies on this.

Response
The department feels that graduate student funding is in a satisfactory state. The department will continue to investigate ways in which it can assist the principal investigators to fund their students.

6. **Communication**: We recommend that the department work with all interested parties to improve communications issues.

   Response
   C&O recognizes the need to pay more attention on an ongoing basis to communication with new students (and with new faculty). Since the review took place, C&O students organized a meeting to discuss their concerns amongst themselves, and these were brought to a department meeting. Department meetings are now always attended by a graduate student representative that can voice graduate student concerns directly. A number of suggestions of graduate students were readily accommodated such as revising some web pages that were out of date or incomplete as this was the source of many of the problems. The students have indicated that they are happy with this response, and C&O will monitor these websites more closely. Departmental staff is closely involved in the budgetary process, and hence the department feels that there is adequate transparency about budget and regulation. The department also feels that admission-related information is adequately communicated.

7. **Flexibility**: Within reason, the department should be open to special request of the students. In particular students should be aware of their options.

   Response
   C&O indicates that they normally grant approval for special requests, if a student offers reasonable academic grounds for a variation in their rules and normally, if the variation is approved by the student's supervisor, then their Graduate Committee accedes to the request. This practice is commonplace and will continue. The department will ask its Graduate Chair to review student rights and options in her/his personal meeting with the student at the end of semester 1 (see response to recommendation 8). The department will also adapt its existing graduate student seminar (mandatory for all students) to incorporate material on student options and rights.

8. **Masters' Advising**: For Masters' students, plan one-on-one short meetings with the Graduate Chair shortly after arrival and maybe once again in the course of the year.

Response

It is common practice for the Mathematics Faculty to organize a graduate student orientation in the Fall. This orientation is organized in collaboration with the departments, and C&O does of course take part. In addition to this, C&O will arrange for the Graduate Chair to have personal meetings with each of the incoming students on arrival, and at the end of their first semester.

Implementation Plan:

	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing Recommendations
1.	Faculty recruitment	The reviewers recommend that the department promotes a more active, focused search in areas of need. This is C&O's current policy.	Chair	
2.	Faculty retention.	Contact faculty members that left the department since 2006 and inquire for reasons. In the future, determine reasons for leaving prior to the event.	Chair	Started, and ongoing
3.	Gender balance	No concrete recommendation was made. We are very aware of this issue, and continue to work at it.	Chair	
4.	Graduate student recruitment	The department currently flies in strong applicants for visits, conducts skype interviews with those applicants, and involves faculty members in this process. The department will continue these practices.	Chair	
5.	Graduate student funding	No recommendation to the department was made		

	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing Recommendations
6.	Communication	Spend more time explaining policies and procedures to new students, and to new hires. Add elected graduate student representative to department meetings. Adapt curriculum of mandatory graduate student seminar to include material on options and rights.	Chair, Graduate Chair	Already started, and ongoing
7.	Flexibility	We are already very flexible. Graduate Chair will review options with students in meeting after semester 1. Will include discussion of student options and rights into graduate seminar.	Chair, Graduate Chair	Started in Fall'16, and continued
8.	Masters advising	Introduce meetings as suggested.	Graduate Chair	Started in Fall'16, and continued.

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: 2022

Date

Signatures of Approval:

Chair/Director Date

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

Faculty Dean Date

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

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

University of Waterloo
SENATE UNDERGRADUATE COUNCIL
Report to Senate
20 November 2017

Senate Undergraduate Council met on 17 October 2017 and recommended that the following be submitted to Senate for approval or information, as noted, in the consent agenda.

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

FOR APPROVAL

ACADEMIC REGULATORY CHANGES

1. Academic Regulations Related to Assignments, Tests, and Final Exams - Accommodations

Motion: That Senate approve the following revisions to the section of the undergraduate calendar titled "Academic Regulations Related to Assignments, Tests, and Final Exams – Accommodations", effective as of September 1, 2018.

Background and Rationale:
The current policy can be found at: https://ugradcalendar.uwaterloo.ca/page/Regulations-Accommodations. See the ninth paragraph.

Text with revisions inline (strikeout = deleted text, bold = new text):

> …If ~~students are~~ **a student is** granted an accommodation to postpone a final examination, ~~they shall write the exam the next time the course is taught or during the next term the student is on campus, whichever comes sooner~~ **the exam is to be written no later than the student's next academic term when the course is offered.** The examination may be written earlier ~~than the specified period if students and their instructors mutually agree upon a date and time or if a final grade is required for continued enrolment~~ **if the student and instructor mutually agree upon a time**. The ~~undergraduate officer~~ academic delegate from the ~~offering~~ ~~**academic**~~ **unit offering the course** should be informed ~~as to the dates and times when deferred final examinations are to be written~~ **of any arrangement for a make-up examination**. If the course instructor ~~of the deferred examination~~ is not available to set and mark the **make-up** examination as well as grade the course overall, the ~~department/school~~ **academic unit** will arrange for these activities to be carried out.

Clean text showing revisions:

> …If a student is granted an accommodation to postpone a final examination, the exam is to be written no later than the student's next academic term when the course is offered. The examination may be written earlier if the student and instructor mutually agree upon a time. The academic delegate from the unit offering the course should be informed of any arrangement for a make-up examination. If the course instructor is not available to set and mark the make-up examination as well as grade the course overall, the academic unit will arrange for these activities to be carried out.

Rationale for proposed revisions: Make-up exams are usually taken when a course is offered. The wording of the first sentence of the current policy suggests that a deferred exam could be written the next term the student is on campus, whether or not the course is offered. The proposed revisions are intended to clarify the intent. All six faculties assented to the proposed revisions.

2. Class Attendance

Motion: That Senate approve the following revisions to the section of the undergraduate calendar titled "General Information – Class Attendance", effective as of September 1, 2018.

Background and Rationale:
The current policy can be found at: http://ugradcalendar.uwaterloo.ca/page/uWaterloo-Class-Attendance.

Text with revisions inline (strikeout = deleted text, bold = new text):

Students are expected to attend all scheduled ~~sections~~ **components** of the courses in which they have enrolled. ~~Non-attendance does not constitute a course drop. Students are responsible for monitoring their class schedule on Quest for any changes~~.

~~On occasion there may be extremely strong demand for a particular course. At the discretion of the department or instructor, the following policy may then be enforced.~~

~~Students who do not attend class during the first week of term may be removed from the class and replaced by students from a waiting list maintained by the course instructor, unless they have justified their absence through the following procedures:~~

- ~~Students who know that they cannot be present during the first week of class for a legitimate reason (such as a family problem, personal or health matter, or unavoidable work situation) must inform the professor, either directly or through the departmental secretary, by telephone or email during regular business hours, before the start of the first class.~~
- ~~A legitimate emergency may make the above impossible. Students wishing to retain their place must inform the professor as soon as possible, but no later than the beginning of the first class of the second week of term.~~

Students may be required to present documentation confirming **the** reasons for non-attendance. **During the course add period, students may be removed from a course for non-attendance.** Students who are removed from a class ~~in accordance with this policy~~ will be notified by the Registrar's Office.

Clean text showing revisions:

Students are expected to attend all scheduled components of the courses in which they are enrolled. Students may be required to present documentation confirming the reasons for non-attendance. During the course add period, students may be removed from a course for non-attendance. Students who are removed from a class will be notified by the Registrar's Office.

Rationale for proposed revisions: There are several reasons an instructor may wish to enforce attendance of all components of a course. It is recommended that the instructor note this requirement in the course description in the calendar (as in the SPCOM example) and in the course outline. The policy itself, is a simple statement of the expectation and possible outcome if the expectation is not met.

SPCOM 223 LEC 0.50 Course ID: 004665

Public Speaking

Theory and practice of public speaking. A workshop course involving design and delivery of various kinds of speeches, and the development of organizational, vocal, listening and critical skills. Students will be videotaped.

[Note: Must attend first class. May be subject to priority enrolment.]

All six faculties assented to the proposed revisions.

3. Student Responsibility – Degree Requirements

Motion: That Senate approve: (a) the removal of Faculty-specific text on student responsibility for meeting degree requirements from the sections of the undergraduate calendar outlined below; and (b) the addition of the proposed new text to the section of the undergraduate calendar titled “General Information”, effective as of September 1, 2018.

Background and Rationale:
Links to current Faculty-specific policies and text to be stricken can be found below:

AHS
http://ugradcalendar.uwaterloo.ca/page/AHS-Responsibility-for-Meeting-Degree-Requirements

~~Students are responsible for being aware of all regulations pertaining to their plans of study. When all requirements for a particular degree have been met, it is each student's responsibility to submit a completed Intention to Graduate - Undergraduate Studies form to the Office of the Registrar. See the Undergraduate Calendar of Events and Academic Deadlines for further information.~~

AHS Undergraduate Committee (for information only) – September 11, 2017

ARTS
http://ugradcalendar.uwaterloo.ca/page/ARTS-Student-Note-Regarding-Student-Responsibility

~~It is the student's responsibility to ascertain that all requirements for graduation have been met. Any exceptions to graduation requirements requested by a student must be approved in writing by the Examinations and Standings Committee of the Arts Faculty. Students should meet with their academic advisor before the start of the 4A term to ensure they are on track to meet all of their academic requirements for graduation, and in enough time to change their course selections if necessary.~~

ARTS Undergraduate Committee (for information only) – November 2, 2017

MATH
https://ugradcalendar.uwaterloo.ca/page/MATH-Degree-Requirements-for-Math-students

~~Students are responsible for being aware of all regulations pertaining to their academic plans. This responsibility includes submitting a completed Intention to Graduate form to the Registrar's Office during their last academic study term.~~

MATH – University policy – not forwarding to undergraduate committee

Note: ENG, ENV, and SCI sections of the calendar do not have analogous text.

Proposed new text:

Students are responsible for their academic progress through to graduation. They must follow all requirements of their plan(s) (including co-operative education, if applicable). In the term before degree completion, students must submit an Intention to Graduate form to the Registrar's Office.

Rationale for proposed revisions: By removing the Faculty-specific versions of this policy and including this information in the "General Information" section of the undergraduate calendar it will ensure consistency and fairness across faculties and it will make it easier for students, faculty and staff to locate and interpret. All six faculties assented to the proposed revisions.

4. Student Responsibility – Full Course Load and Non-Academic Activities

Motion: That Senate approve: (a) the removal of Faculty-specific text on student responsibility related to maintaining a full course load and engaging in non-academic activities from the sections of the undergraduate calendar outlined below; and (b) the addition of the proposed new text to the section of the undergraduate calendar titled General Information, effective as of September 1, 2018.

Background and Rationale:
Links to current Faculty-specific policies and text to be stricken can be found below:

AHS and ARTS
http://ugradcalendar.uwaterloo.ca/page/AHS-Incompatibility-of-FT-Study-FT-Employment
http://ugradcalendar.uwaterloo.ca/page/ARTS-Student-Note-Regarding-Student-Responsibility
~~Students who by choice or necessity work on non-academic activities more than ten hours per week should, where possible, structure their course/work load so that they can attend fully to their academic obligations.~~

AHS Undergraduate Committee (for information only) – September 11, 2017

ARTS Undergraduate Committee (for information only) – November 2, 2017

ENG
https://ugradcalendar.uwaterloo.ca/page/ENG-Incompatibility-FT-Study-with-FT-Employment
~~Students who by choice or necessity work on non-academic activities more than ten hours per week should, where possible, structure their course/work load so that they can attend fully to their academic obligations. Please note that none of the undergraduate programs in Engineering, including Architecture can be completed on a part-time basis at the University of Waterloo.~~

ENG Undergraduate Committee (for information only) – November 2017

MATH
https://ugradcalendar.uwaterloo.ca/page/MATH-Degree-Requirements-for-Math-students
~~Students who by choice or necessity work on non-academic activities more than 10 hours per week should, where possible, structure their course/work load so that they can attend fully to their academic obligations. The Standings and Promotions (S&P) Committee will not grant petitions based on time pressure resulting from employment.~~

MATH – University policy – not forwarding to Undergraduate Committee

SCIENCE
http://ugradcalendar.uwaterloo.ca/page/SCI-Reduced-Course-Load1
~~Students who by choice or necessity work on non-academic activities more than ten hours per week should, where possible, structure their course/work load so that they can attend fully to their academic obligations.~~

Science Undergraduate Council – October 3, 2017. Refer to Science SUC submission for additional revisions.

Note: ENV removed this policy from its section of the calendar in 2016/2017

Proposed new text:

All students should structure their schedules so that they can fully attend to their academic obligations. Students with a full-course load who by choice or necessity participate in non-academic activities should limit these activities to no more than 10 hours per week.

Rationale for proposed revisions: By removing the faculty-specific versions of this policy and including this information in the "General Information" section of the undergraduate calendar it will ensure consistency and fairness across faculties and it will make it easier for students, faculty, and staff to locate and interpret. All six faculties assented to these revisions.

5. Grading System

Motion: That Senate approve revisions to the Faculty-specific sections of the undergraduate calendar re: the grading system, as well as the General Information – Grading System section of the undergraduate calendar, as outlined below, effective as of September 1, 2018.

Background and Rationale

The current general policy can be found at: http://ugradcalendar.uwaterloo.ca/page/uWaterloo-Grading-System.

Rationale for the following proposed revisions: There was a review of all Grading System content in the calendar. The RPL grade was deleted because it was used only once in 17 years and Engineering confirmed that this grade is not used by the Faculty. By removing the faculty-specific versions of this policy and placing the proposed text in the "General Information" section of the undergraduate calendar it will ensure consistency and fairness across faculties and it will make it easier for students, faculty, and staff to locate and interpret. All six faculties assented to these revisions.

a. Grading System: Numeric Grades and Non-Numeric Grades

Proposed revisions (inline) to the general policy re: numeric and non-numeric grades (strikeout = deleted text, bold = new text):

All faculties use numeric grades on a scale from 0 to 100. Any grade between 0 and 32 is treated as having a value of 32 when averages for promotions and awards are calculated.

Grades for all courses taken ~~prior to~~ **before** Fall 2001 appear either as one of 15 letter grades from A+ through F- or as numeric ~~marks~~ **grades** from 0 to 100.

~~Effective Fall 2001, numeric grades on a scale from 0-100 are used by all faculties.~~

Averages are reported in all faculties as percentages. **"**Average **C**alculation **V**alues**"** are used for calculating ~~overall~~ averages for students with letter grades on their records.

The following conversion scale applies to Waterloo courses taken ~~prior to~~ **before** Fall 2001 and Wilfrid Laurier University (Laurier) courses ~~taken~~ with a letter grade.

Assigned Letter Grades	**Percentage Ranges**	Average Calculation Values
A+	**90-100**	95
A	**85-89**	89
A-	**80-84**	83
B+	**77-79**	78
B	**73-76**	75
B-	**70-72**	72
C+	**67-69**	68
C	**63-66**	65
C-	**60-62**	62
D+	**57-59**	58
D	**53-56**	55
D-	**50-52**	52
F+	**42-49**	46
F	**35-41**	38
F-	**0-34**	32

Non-numeric Grades

Grade	Description	~~Average Calculation Value~~
AEG	Aegrotat**: C**redit granted due to illness or extenuating circumstances**. More than 50% of the course work must have been completed with a passing grade.**	~~not applicable~~
AUD	Audit**:** ~~only, no credit granted~~ **Student enrolled in the course but no credit granted.** **Note: An AUD grade will not be recognized or recorded for students enrolled in the following faculties:** • **Engineering** • **Mathematics (except post-degree students)** • **Science**	~~not applicable~~
CR	Credit**: Credit granted for the course but not included in any average**	~~not~~

Grade	Description	~~Average Calculation Value~~
	calculation.	~~applicable~~
DNW	~~Did not write examination, no credit granted~~ **Did Not Write Examination: A course grade of INC or NMR not appropriate. No credit granted. The Average Calculation Value is 32.**	~~32~~
IP	~~Course in progress, no grade assigned at this time and no credit granted~~ **In Progress: Course requirements not complete. No grade has been assigned and no credit granted at this time. The course is in progress as a result of the course design or delivery rather than the student's performance. A final grade replaces the IP grade(s) when the coursework has been completed. Students intending to graduate must resolve any IP grades by completing the course or accepting an FTC grade.**	~~not applicable~~
MM	Missing **M**ark**: N**o credit granted **and not included in any average calculation.**	~~not applicable~~
NCR	No **C**redit**:** ~~granted, failure recorded~~ **Treated as a failed course. Not included in any average calculation.**	~~not applicable~~
NG	~~In progress grade~~ **No Grade: Course in progress and cannot be dropped by the student.**	~~not applicable~~
NMR	No **M**ark **R**eported**:** ~~no credit granted~~ **The student did not attend classes and no term work was submitted. No credit granted and the Average Calculation Value is 32.**	~~32~~
~~RPL~~	~~Supplemental grade confirming a failed course has been replaced by a suitable alternative passed course~~	~~not applicable~~
UR	~~Grade~~ **U**nder **R**eview**: Grade under review** or disciplinary proceedings underway~~,~~ **with a** decision pending**. N**o credit granted. ~~**Note:**~~ **Normally, w**here disciplinary penalties are being considered or have been imposed for an academic offense committed in a course, ~~the~~ **a** student may not drop ~~the~~ **that** course ~~in question. The student is responsible for all course material and assignments until the case is resolved.~~ **The UR grade will be replaced by the final course grade.**	~~not applicable~~
WD	Withdrew**:** ~~after the drop deadline, no credit granted~~ **Course dropped after the third week of classes and before the WF period. No credit granted.**	~~not applicable~~
WF	Withdrew/Failure**:** ~~no credit granted~~ **Course dropped after the tenth week of classes. No credit granted and Average Calculation Value is 32.**	~~32~~

INC- **(To be moved to the non-numeric grades table) Incomplete Course: Course requirements not complete.**
~~An~~ INC should only be assigned when an instructor~~-student agreement for~~ **approves the** completion of outstanding course element(s) ~~is in place~~ **after final grades have been submitted.**

All assessment components for a course are to be completed during the term in which the course is taken. In exceptional circumstances, an instructor may grant a student an extension for specific outstanding course element(s), given credible documentation has been submitted by the student[1]. The instructor will determine completion dates for outstanding course element(s) within a maximum lapse period of one year from the fully graded date of the term in which the course was offered. ~~An INC agreement will specify~~

The earned grade**,** ~~to date and~~ the course element(s) to be completed, **and the due date are documented on the INC grade form.**

A grade of INC will remain until the outstanding course element(s) have been graded or the lapse period has expired.

When the lapse period has expired, the INC reverts to the:

- earned grade, based on all completed course element(s), OR
- if the ~~syllabus for the~~ course **outline** specified that the missing coursework was required to pass the course, the lesser of: the earned grade or 4% less than the passing grade.

Students intending to graduate must resolve any INC grades by completing the outstanding requirements or accepting the earned grade.

[1] If the circumstance is related to a documented disability, students are encouraged to connect with AccessAbility Services ~~in order to protect their privacy~~ **should they wish to preserve the privacy of documentation.**

FTC - **(To be moved to the non-numeric grades table)**
~~**Failure to complete course requirements, no credit granted. Counts as 32 in average calculations.**~~
Failure to Complete: Course requirements not complete. No credit granted. The Average Calculation Value is 32.

Proposed revised text (clean) to the general policy re: numeric and non-numeric grades (Note: some text has been reorganized in the clean version):

Numeric Grades
All faculties use numeric grades on a scale from 0 to 100. Any grade between 0 and 32 is treated as having a value of 32 when averages for promotions and awards are calculated.

Averages are reported in all Faculties as percentages.

Grades for all courses taken before Fall 2001 appear either as one of 15 letter grades from A+ through F- or as numeric grades from 0 to 100. The following conversion scale applies for Waterloo courses taken before Fall 2001 and Wilfrid Laurier University (Laurier) courses with a letter grade. “Average Calculation Values” are used for calculating averages for students with letter grades on their records.

Assigned Letter Grades	**Percentage Ranges**	**Average Calculation Values**
A+	90-100	95
A	85-89	89
A-	80-84	83
B+	77-79	78
B	73-76	75
B-	70-72	72
C+	67-69	68
C	63-66	65
C-	60-62	62
D+	57-59	58
D	53-56	55
D-	50-52	52
F+	42-49	46
F	35-41	38

Assigned Letter Grades	Percentage Ranges	Average Calculation Values
F-	0-34	32

Non-numeric Grades

Grade	Description
AEG	Aegrotat: Credit granted due to illness or extenuating circumstances. More than 50% of the course work must have been completed with a passing grade.
AUD	Audit: Student enrolled in the course but no credit granted. **Note: An AUD grade will not be recognized or recorded for students enrolled in the following faculties:** • **Engineering** • **Mathematics (except post-degree students)** • **Science**
CR	Credit: Credit granted for the course but not included in any average calculation.
DNW	Did Not Write Examination: A course grade of INC or NMR not appropriate. No credit granted. The Average Calculation Value is 32.
FTC	Failure to Complete: Course requirements not complete. No credit granted. The Average Calculation Value is 32.
INC	Incomplete Course: Course requirements not complete. INC should only be assigned when an instructor approves the completion of outstanding course element(s) after final grades have been submitted. All assessment components for a course are to be completed during the term in which the course is taken. In exceptional circumstances, an instructor may grant a student an extension for specific outstanding course element(s), given credible documentation has been submitted by the student[1]. The instructor will determine completion dates for outstanding course element(s) within a maximum lapse period of one year from the fully graded date of the term in which the course was offered. The earned grade, the course element(s) to be completed, and the due date are documented on the INC form. A grade of INC will remain until the outstanding course element(s) have been graded or the lapse period has expired. When the lapse period has expired, the INC reverts to the: • earned grade, based on all completed course element(s), OR • if the course outline specified that the missing coursework was required to pass the course, the lesser of: the earned grade or 4% less than the passing grade. Students intending to graduate must resolve any INC grades by completing the outstanding requirements or accepting the earned grade. [1] If the circumstance is related to a documented disability, students are encouraged to connect with AccessAbility Services should they wish to preserve the privacy of documentation.
IP	In Progress: Course requirements not complete. No grade has been assigned and no credit granted at this time. The course is in progress as a result of the course design or delivery rather than the student's performance. A final grade replaces the IP grade(s) when the coursework has been completed. Students intending to graduate must resolve any IP grades by completing the course or accepting an FTC grade.
MM	Missing Mark: No credit granted and not included in any average calculation.
NCR	No Credit: Treated as a failed course. Not included in any average calculation.

Grade	Description
NG	No Grade: Course in progress and cannot be dropped by the student.
NMR	No Mark Reported: The student did not attend classes and no term work was submitted. No credit granted and the Average Calculation Value is 32.
UR	Under Review: Grade under review or disciplinary proceedings underway with a decision pending. No credit granted. Normally, where disciplinary penalties are being considered or have been imposed for an academic offense committed in a course, a student may not drop that course. The UR grade will be replaced by the final course grade.
WD	Withdrew: Course dropped after the third week of classes and before the WF period. No credit granted.
WF	Withdrew/Failure: Course dropped after the tenth week of classes. No credit granted and Average Calculation Value is 32.

Faculty-specific sections to be revised (strikeout = deleted text, bold = new text):

AHS - http://ugradcalendar.uwaterloo.ca/page/AHS-Grades

AHS Faculty Undergraduate Committee (for information only) – September 11, 2017

Note: AHS included the changes made to their section of the calendar in their submission to SUC.

ARTS - http://ugradcalendar.uwaterloo.ca/page/ARTS-Grading-System

ARTS Faculty Undergraduate Committee (for information only) – November 2, 2017

Note: ARTS included the changes made to their section of the calendar in their submission to SUC.

SCIENCE – https://ugradcalendar.uwaterloo.ca/page/SCI-Rules-for-Students-Enrolled-in-Science-Crses-1 (See #6)

SCIENCE Faculty Undergraduate Committee (for information only) – October 3, 2017

Note: SCIENCE included the changes made to their section of the calendar in their submission to SUC.

ENGINEERING - http://ugradcalendar.uwaterloo.ca/page/ENG-Examinations-and-Promotions-Rules (See #14)

Most courses at the University of Waterloo are assigned a numerical grade (between zero and 100) by the examiners. Any grade between zero and 32 is treated as having a value of 32 when averages (for promotions and awards) are calculated. ~~The following exceptions are permitted for students in programs evaluated using these promotion rules:~~ **Non-numerical grade definitions and related university-level processes are included in the Grading System<<link>> section of the Calendar.**

~~Grade~~	~~Description~~
~~AEG~~	~~Aegrotat. Credit granted due to illness or extenuating circumstances; student has satisfactory understanding of the course.~~
~~CR~~	~~Credit granted. Performance was satisfactory.~~
~~DNW~~	~~Did not write. The student did not withdraw from the course and was not eligible for an Incomplete grade. The student did not complete sufficient proportion of the assignments, tests, and examinations for an evaluation to be made.~~
~~FM (or F-)~~	~~F Minus indicates that the student earned a grade of 32 or less in the course material. This is a failing grade.~~
~~FTC~~	~~Failure to complete. The value for FTC for average calculation is 32.~~
~~INC~~	~~Incomplete. See General Information, Grading System.~~
~~IP~~	~~Course in progress, no grade assigned at this time.~~
~~NCR~~	~~No credit granted. Performance was unsatisfactory.~~

~~Grade~~	~~Description~~
UR	Grade under review, decision pending.

~~In cases where students have taken courses in a Faculty where letter grades were assigned, the letter grades will be converted for the purposes of reporting and averaging according to the following table:~~

~~Assigned Letter Grades~~	~~Average Calculation Values~~
~~A+~~	~~95~~
~~A~~	~~89~~
~~A-~~	~~83~~
~~B+~~	~~78~~
~~B~~	~~75~~
~~B-~~	~~72~~
~~C+~~	~~68~~
~~C~~	~~65~~
~~C-~~	~~62~~
~~D+~~	~~58~~
~~D~~	~~55~~
~~D-~~	~~52~~
~~F+~~	~~46~~
~~F~~	~~38~~
~~F-~~	~~32~~

ENG Faculty Undergraduate Committee (for information only) – November 2017

ENVIRONMENT - http://ugradcalendar.uwaterloo.ca/page/ENV-Plans-SubPlans-Course-Enrolment-Grading

1. The University Grading System is used in the Faculty of Environment. Important information concerning university-level processes and grade definitions are noted in the General section of this calendar.

~~1. An instructor-student agreement must be in place before an Incomplete (INC) grade can be assigned.~~

2. An Aegrotat (AEG) grade, credit granted due to illness or extenuating circumstances, may be awarded in extraordinary circumstances or when a prolonged recovery from illness is expected. Students must submit a petition accompanied by official documentation to be considered for an AEG grade. Students are normally required to have successfully completed half the course requirement and demonstrated understanding of the course content to the extent that the instructor is satisfied that the student should receive credit for the course, even though a numerical grade could not be set.

~~3.~~ The grade of In Progress (IP) may be assigned to the first half of what is essentially a year course which is listed as two courses (e.g., GEOG 490A and GEOG 490B). The grade indicates that the course is in progress and that when completed, a final grade will be assigned to both the A and B halves of the course (usually the same grade). When the second or B half of such a course is dropped ~~as the result of a change or withdrawal~~, a Petition for Exception to Academic Regulations must be filed to have the first or A half dropped. ~~Students have one year to complete a course in which an IP grade has been granted. After one year, the grade will be converted to Failed to Complete (FTC), which equates to a grade of 32%.~~

4. Students may request to register for Audit status (AUD) in a course taught on campus if the Faculty of the course allows Audits. ~~No credit is granted for a course in which an AUD grade is awarded.~~ Students

interested in an Audit must consult with the course instructor at the beginning of the course to ascertain what conditions are attached to the granting of an AUD ~~by the course instructor~~. Audits must be approved by the course instructor and the student's academic plan advisor during the two week add period. Failure to satisfy the conditions of an Audit will result in the course receiving a grade of WD.

ENV Faculty Council (for information only) – September 28, 2017

MATHEMATICS - http://ugradcalendar.uwaterloo.ca/page/MATH-Math-Faculty-Policies#grades

~~Grades~~

- ~~The University's grading system describes the grading practice at Waterloo and lists the letter conversion scale for courses taken prior to fall 2001 and Wilfrid Laurier University (Laurier) courses with a letter grade, non-numeric grades, and unit weights.~~
- ~~CS 499T is the only course in the Faculty of Mathematics for which numerical grades are not assigned. Students in the Faculty of Mathematics may not register for official Audit (AUD) status in a course. This policy applies to all undergraduate students in Mathematics, including non-degree students and students on exchange from other universities, but does not apply to post-degree students.~~

MATH Faculty Undergraduate Committee – approved deletion of CS 499T – June 26, 2017

b. Grading System: Changes to Official Grades on a Student's Record

Proposed revisions (inline) to the general policy re: changes to official grades on a student's record (strikeout = deleted text, bold = new text):

Official grades are released to students each term in accordance with the Calendar of Events and Academic Guidelines. A change to an official grade can result from one of the following circumstances:

1. Instructors may change a grade in response to a student's completion of coursework as defined in an INC agreement or request for reassessment of submitted coursework. Grade changes of this nature must be submitted by instructors within one year of the term's fully graded date, in accordance with the Document Retention Schedule for Examination Papers and Course Assignments.
2. After the one-year period, official grades may only be changed as the result of policy-related processes, such as student petitions or challenges (Policy 70), student discipline decisions (Policy 71), and/or student appeals (Policy 72).

   ~~Any~~ **G**rade change**s** will ~~result in the re-calculation of all averages and reassessment of academic standings and/or graduation eligibility~~ **be automatically reflected in the calculation of a student's cumulative and term averages**. ~~Until a~~ **Normally,** grade change**s** ~~is granted, the student record will remain unchanged and academic advice provided will be based on the existing record~~ **affect academic standing and other plan averages (e.g., major average) in future academic terms**. ~~Students should be aware that a pending~~ **G**rade change**s** may impact ~~their~~ **student** tuition fees, financial aid eligibility, and subsequent studies. **Academic advice will be provided based on the existing record.**

Proposed revisions (clean) to the general policy re: changes to official grades on a student's record:

…Grade changes will be automatically reflected in the calculation of a student's cumulative and term averages. Normally, grade changes affect academic standing and other plan averages (e.g., major average) in future academic terms. Grade changes may impact student tuition fees, financial aid eligibility, and subsequent studies. Academic advice will be provided based on the existing record.

Faculty-specific section to be deleted:

ENV: - http://ugradcalendar.uwaterloo.ca/page/ENV-Exams-Petitions-and-Appeals-Academic-Standing

~~**Changes to Official Grades on a Student's Record**~~

~~Official grades are released to students each term in accordance with the Calendar of Events and Academic Guidelines. A change to an official grade can result from one of the following circumstances:~~

1. ~~Instructors may change a grade in response to a student's completion of coursework as defined in an INC agreement or request for reassessment of submitted coursework. Grade changes of this nature must be~~

~~submitted by instructors within one year of the date that the term's official grades are released on Quest, in accordance with the Document Retention Schedule for Examination Papers and Course Assignments.~~

~~2. After the one-year period, official grades may only be changed as the result of policy-related processes, such as student petitions or challenges (Policy 70), student discipline decisions (Policy 71), and/or student appeals (Policy 72).~~

~~Any grade change will result in the re-calculation of all averages and reassessment of academic standings and/or graduation eligibility. Until a grade change is granted, the student record will remain unchanged and academic advice provided will be based on the existing record. Students should be aware that a pending grade change may impact their tuition fees, financial aid eligibility, and subsequent studies.~~

~~Once the degree, diploma, or certificate has been conferred, a student is ratifying the undergraduate academic record upon which it was based. Therefore, student initiated changes to that record will not be made.~~

ENV Faculty Council (for information only) – September 28, 2017

c. Grading System: Unit Weights and Degree Requirements

Proposed revisions (inline) to the general policy re: unit weights and degree requirements (strikeout = deleted text, bold = new text):

Unit Weights and Degree Requirements
Courses are assigned unit weights, which vary from ~~0.25 to 1.0~~ **0.00 to 3.00** credit**s** ~~or more~~. Most one-term courses ~~have~~ **carry** a 0.5 unit weight ~~except for lab courses, which are generally 0.25 unit each.~~ Course unit weights are used to calculate weighted averages. ~~as well as the tuition fees payable for the term. Part-time students especially should be aware of this fact when choosing courses.~~

Proposed revisions (clean) to the general policy re: unit weights and degree requirements:

Unit Weights and Degree Requirements
Courses are assigned unit weights, which vary from 0.00 to 3.00 credits. Most one-term courses carry a 0.5 unit weight. Course unit weights are used to calculate weighted averages.

6. Awards and Financial Aid

Motion: To approve (a) the removal of the individual award descriptions currently found in the Awards and Financial Aid section of the Undergraduate Calendar; and (b) revisions to the remaining introductory pages as outlined below, effective September 1, 2018.

Rationale and background:

These award descriptions total thirty web pages and over 700 awards. This content is now available to students through two searchable databases on the Students Awards & Financial Aid (SAFA) website. Benefits include:

- improved clarity for students, departments, and donors about where to search for award details
- award details in UG Calendar are limited to the award description; students still need to visit the SAFA website to access application forms
- improved efficiency for maintaining content

Remaining in the Awards and Financial Aid section will be a revised Introduction page, a new Undergraduate Awards page, and the existing Regulations Governing University of Waterloo Awards page (no changes). The details being removed from the introductory page are provided on the SAFA website. The revised/new pages are detailed below.

The current introductory pages can be found at:
http://ugradcalendar.uwaterloo.ca/page/Awards-and-Financial-Aid-Introduction

Proposed revisions (inline) to the introductory pages (strikeout = deleted text, bold = new text):

Student Awards & Financial Aid is ~~located in Needles Hall. Office hours are Monday to Friday, 8:30 a.m. to 4:30 p.m. The office is~~ responsible for administration of the following programs:

- Ontario Student Assistance Program (OSAP) and other government student aid programs for both undergraduate and graduate students.
- Scholarships, bursaries, and emergency loans for undergraduate students.
- Bursaries for graduate students.
- **Work placement and work study programs.**

~~A complete listing and description of the scholarships, awards, and bursaries administered by Student Awards & Financial Aid can be found in the Awards and Financial Aid section of this Calendar.~~

~~Additional~~ **I**nformation**,** including details on when and how to apply for **OSAP,** scholarships, awards, and bursaries, ~~as well as, tips on calculating expenses and covering costs~~ can be found on the Student Awards & Financial Aid website. (link to uwaterloo.ca/safa).

Student Awards & Financial Aid is located in Needles Hall. Office hours are Monday to Friday, 8:30 a.m. to 4:30 p.m.

Students may contact the office by telephone at 519-888-4567, ext. 33583, **by email at safainfo@uwaterloo.ca,** or by mail at Student Awards & Financial Aid, Needles Hall, University of Waterloo, Waterloo, Ontario, N2L 3G1.

Note
~~The following information pertains to the award year of May 1, 2017 to April 30, 2018 and is subject to change without notice.~~
Procedures, practices, and funding availability may change during the student's experience at Waterloo and is subject to change without notice. Refer to the Student Awards & Financial Aid website (link to uwaterloo.ca/safa) for the most up to date information.

~~Academic Merit~~
~~The minimum standard used in scholarship competitions based on academic merit is an average or grade of 80%.~~

~~Definitions~~
~~The term "award" is a general designation applied to any scholarship, prize, medal, fellowship, or grant of money assigned to a student. Within this designation, awards are further defined as follows:~~

~~Scholarship - A monetary award based primarily on outstanding academic merit (80% or greater) or excellence in a specific subject or group of subjects.~~

~~Award - A monetary award based on a combination of all or some of the following: academic performance, leadership or involvement in extracurricular activities or student affairs at the university or in the community, work-related experience, athletic achievement, or work-term performance, and may include a financial need component.~~

~~Prizes and Medals - A non-monetary award (e.g., book prize, instruments, graduating medal) given in recognition of academic performance or excellence in the area to which the award pertains.~~

~~Work-Term Report Award - A monetary award based on writing skills demonstrated in work reports.~~

~~Bursary - A monetary grant based primarily on financial need and including a satisfactory academic standing.~~

Proposed revisions (clean) to the introductory pages:
Student Awards & Financial Aid is responsible for administration of the following programs:

- Ontario Student Assistance Program (OSAP) and other government student aid programs for both undergraduate and graduate students.

- Scholarships, bursaries, and emergency loans for undergraduate students.
- Bursaries for graduate students.
- Work placement and work study programs.

Information, including details on when and how to apply for OSAP, scholarships, awards, and bursaries, can be found on the Student Awards & Financial Aid website (link to uwaterloo.ca/safa).

Student Awards & Financial Aid is located in Needles Hall. Office hours are Monday to Friday, 8:30 a.m. to 4:30 p.m.

Students may contact the office by telephone at 519-888-4567, ext. 33583, by email at safainfo@uwaterloo.ca, or by mail at Student Awards & Financial Aid, Needles Hall, University of Waterloo, Waterloo, Ontario, N2L 3G1.

Note
Procedures, practices, and funding availability may change during the student's experience at Waterloo and is subject to change without notice. Refer to the Student Awards & Financial Aid website (link to uwaterloo.ca/safa) for the most up to date information.

Proposed new page:

Undergraduate Awards

Student Awards & Financial Aid manages hundreds of undergraduate awards for students newly admitted to first-year studies and for students currently enrolled in an undergraduate program at the University of Waterloo.

Details about these scholarship, award, and bursary opportunities can be found in two databases:

- entrance awards (link to https://uwaterloo.ca/undergraduate-entrance-awards/) for future undergraduate students

- undergraduate awards (link to https://uwaterloo.ca/student-awards-financial-aid/awards/database) for current undergraduate students

These databases are searchable using a variety of criteria, e.g., program of study, award type, application requirements, etc.

Note
The information contained in the databases is subject to change at any time depending on available funding.

7. Residency Rules

Motion: That Senate approve: (a) the removal or revision of Faculty-specific text on residency rules, as noted below; and (b) the addition of the proposed new institution-wide policy to the undergraduate calendar, effective as of September 1, 2018

Rationale and background:
To make the Residency rule general at the Institution/Faculty level. If there are specific details for specific plans these can be documented in the Faculty section of the calendar along with the plan in question (under specific heading for Transfer Students).

Current text:

Faculty	Current Text
AHS	No specific reference made to Residency.

Arts	http://ugradcalendar.uwaterloo.ca/page/ARTS-Admission-Transfer-Credit https://ugradcalendar.uwaterloo.ca/page/ARTS-Degree-Residency-Requirement http://ugradcalendar.uwaterloo.ca/page/ARTS-Psychology-Minor Students are required to take at least 50% of the courses required to graduate at the University of Waterloo. These University of Waterloo courses must be graded on a numerical basis, be in the average, and must include: • at least half the total number of academic course units required for **each** degree, major, minor, or diploma; • at least 6.5 academic course units (13 courses) in Arts subjects for a Four-Year Liberal Studies degree; at least four academic course units (eight courses) in Arts subjects for a Three-Year Liberal Studies degree. All students in the Faculty of Arts are bound by the 50% residency requirement rule. This residency requirement applies in the case of all transfers, whether internal or external, readmissions, including second Bachelor degrees. See the Transfer Credit section for additional information. Psych minor (NOTE): Students enrolled in academic plans in Psychology must successfully complete at least half of the total number of academic course units required in Psychology for their academic plan from the University of Waterloo with numerical grades.-
Engineering	**Transfer Credits -** Transfer credit may be given for courses in which a grade of 70% or better was obtained. Such courses must have been taken at a degree granting University. Students entering the Honours BAS Academic Program may apply for up to six term course credits towards the elective requirements of the degree. Application must be made to the Undergraduate Officer where transfer credits are desired as an exemption from required core courses. A maximum of 20 term course credits total may be transferred towards course requirements for the Honours BAS degree.
Environment	Transfer students will only be admitted in the fall term. Transfer students enrolled will be required to complete a minimum of 50% of their degree requirements in the Faculty of Environment at the University of Waterloo. Transfer Credit Allowance The maximum number of transfer credits (internal and external) that are allowed to be counted towards a Bachelor of Environmental Studies or Bachelor of Knowledge Integration degree is: • General Geography and Environmental Management: Any combination of internal and external transfer credits that does not exceed 15 courses (7.5 units). • Environment and Business, Honours Geography and Environmental Management, Geomatics, International Development, and Knowledge Integration: Any combination of internal and external transfer credits that does not exceed 20 courses (10.0 units). • Geography and Aviation: Any combination of internal and external transfer credits that does not exceed 20 courses (10.0 units), including flight training requirements. • Planning: Any combination of internal and external transfer credits that does not exceed 20 courses (10.0 units) with a maximum of 5.0 units being granted at time of admission from an external accredited post-secondary institution. Environment, Resources and Sustainability: Any combination of internal and external transfer credits that does not exceed 20 courses (10.0 units) with a maximum of 5.0 units being granted at time of admission from an external accredited post-secondary institution. A maximum of seven courses (3.5 units) at the 100-level will be transferred upon admission.

Math	Students must normally complete at least 50% of the minimum number of math courses and at least 50% of the total number of units required for a Faculty of Mathematics degree while registered at the University of Waterloo. Students transferring into a co-op system of study must complete at least five work terms, unless otherwise specified by plan requirements.
Science	**Transfer Students** Students may be accepted for transfer from other Faculties in the University or from other universities. Transfer credit will be evaluated in terms of the number of units allowed and the number remaining for a degree. Normally transfer students will be required to complete at least half of their course work while registered in the Faculty of Science. A maximum of 10.0 lecture units may be transferred for all Honours programs, except Science and Aviation (see below). Lab units may be transferred beyond the 10.0 unit maximum. For the Three-Year General program, a maximum of 7.5 units (any combination of lecture and lab units, with no more than 1.0 lab unit) may be transferred. University of Waterloo students applying for internal transfer to the Faculty of Science will receive transfer credit for all relevant science or math courses taken at the University in which a minimum grade of 50% was attained. Consideration for transfer credit for non-Science courses will be given for courses completed with a minimum grade of 60%. Transfer credit will be considered for all relevant courses taken at another university in which a minimum of 60% was attained. Only 5.0 transfer credit units are allowed for new students entering any Science co-operative program as well as Science and Aviation. Credits transferred to any Science program are not included in cumulative average calculations. Students applying to transfer to a co-operative program in the Faculty of Science will not normally be admitted above the 2B term level. Normally, we only consider transfer credits from prior institutions where the courses have been taken within the last ten years. Students currently holding a Bachelor of Science degree will normally be considered for admission into post-degree studies only.

Proposed new institution-wide policy:

Residency (hyperlink to glossary definition: the portion of a degree that a student must complete at the University of Waterloo)

At least 50% of the University of Waterloo total degree requirements must be taken while registered as a student at the University of Waterloo. A graduate who is readmitted to pursue an additional degree must complete at least 50% of the requirements for the additional degree at the University of Waterloo.
Note: Degrees offered jointly with another academic institution (e.g., 2+2 agreements) are not subject to the Residency policy.

Faculty-specific sections to be revised (strikeout = deleted text, bold = new text):

AHS Faculty Undergraduate Committee (for information only) – September 11, 2017

ARTS – https://ugradcalendar.uwaterloo.ca/page/ARTS-Degree-Residency-Requirement and
https://ugradcalendar.uwaterloo.ca/page/ARTS-Admission-Transfer-Credit
ARTS approved the deletion of the paragraph in the Residency Requirement page and the Psychology note.
ARTS included the changes made to their section of the calendar in this submission to SUC.

SCIENCE – http://ugradcalendar.uwaterloo.ca/page/SCI-Application-for-Readmission-and-Transfer-Stds
SCIENCE Faculty Undergraduate Committee (for approval) – October 3, 2017
SCIENCE included the changes made to their section of the calendar in this submission to SUC.

ENGINEERING:
http://ugradcalendar.uwaterloo.ca/page/ENG-Architecture-Academic-Decisions
Transfer credit may be given for courses in which a grade of 70% or better was obtained. Such courses must have been taken at a degree granting University. ~~Students entering the Honours BAS Academic Program may apply for up to six term course credits towards the elective requirements of the degree~~. Application must be made to the Undergraduate Officer where transfer credits are desired as an exemption from required core courses~~. A maximum of 20 term course credits total may be transferred towards course requirements for the Honours BAS degree.~~

ENG Faculty Undergraduate Committee (for information only) – November 2017

ENVIRONMENT:

Transfer Students
http://ugradcalendar.uwaterloo.ca/page/ENV-Honours-Environment-and-Business-Co-op-and-Reg
~~Transfer students enrolled will be required to complete a minimum of 50% of their degree requirements in the Faculty of Environment at the University of Waterloo.~~

Environment, Resources and Sustainability
http://ugradcalendar.uwaterloo.ca/page/ENV-Env-Res-Sus-Env-Res-Stud-Hons-Reg-Co-op
http://ugradcalendar.uwaterloo.ca/page/ENV-Admission-Transfer-Credits-WLU-Courses-1
Transfer students
Students wishing to transfer to Environment, Resources and Sustainability may receive credit for courses previously completed. Students should meet with the Undergraduate Associate Director to determine transferable courses and course selections for first year. See ~~Transfer Credit Allowance~~ **Requirements for Calculation of Plan Averages** section of this calendar for more information.

Geography and Environmental Management Honours
http://ugradcalendar.uwaterloo.ca/page/ENV-Honours-Geomatics-Regular-and-Co-op
~~Transfer Courses~~
~~Transfer students enrolled will be required to complete a minimum of 50% of their course work and half their geography units in the Faculty of Environment at the University of Waterloo.~~

Geography and Aviation
http://ugradcalendar.uwaterloo.ca/page/ENV-Honours-Geography-and-Aviation-Regular
~~Transfer Courses – University of Waterloo Courses~~
~~Transfer students are required to complete a minimum of 50% of their University of Waterloo course work and half their Geography units in the Faculty of Environment at the University of Waterloo.~~

Geomatics
http://ugradcalendar.uwaterloo.ca/page/ENV-Honours-Geomatics-Regular-and-Co-op
Transfer Courses
It is possible for non-Geomatics students to apply for admission to Year Two. Advanced standing may be obtained through the transfer of courses/units from other Academic Plans and Institutions. Normally, advanced standing will not be granted to transfer students beyond the Year-One level (10 courses/5.0 units). ~~All transfer students are required to complete a minimum of two full academic years before being eligible for graduation.~~

ENV Faculty Council (for information only) – September 28, 2017

MATHEMATICS:
http://ugradcalendar.uwaterloo.ca/page/MATH-Math-Faculty-Policies#residency
Residency Requirement
~~Students must normally complete at least 50% of the minimum number of math courses and at least 50% of the total number of units required for a Faculty of Mathematics degree while registered at the University of Waterloo. Students transferring into a co-op system of study must complete at least five work terms, unless otherwise specified by plan requirements.~~

MATH Faculty Undergraduate Committee – approved – June 26, 2017

http://ugradcalendar.uwaterloo.ca/page/MATH-Degree-Requirements-for-Math-students - This table specifies the co-op requirements for all math students.

FOR INFORMATION

CURRICULAR MODIFICATIONS

Course submissions, minor plan changes and faculty regulation changes were approved for the Faculties of applied health sciences (kinesiology; public health and health systems); arts (anthropology; arts academic plans; communications skills requirement; co-op requirements; data analysis; economics; French studies; grading system; human sciences; independent studies; political science; psychology; residency requirement; statistics for Arts students; student responsibility; transfer credit); engineering (accelerated master's program; architecture; biomedical engineering; chemical engineering; complementary studies elective; dean's honour list and examinations and promotions; electrical & computer engineering; engineering options; geological engineering; nanotechnology engineering; system design engineering; term sequence & first year table); environment (ecological restoration and rehabilitation; English language proficiency requirement; environment, enterprise & development; environment, resources & sustainability; environmental assessment; environmental studies; geography & environmental management; interdisciplinary studies; internal and external transfer credits; international development; knowledge integration; planning; transfer credit allowance; urban studies); mathematics (business administration and computer science double degree; business administration and mathematics double degree; computational mathematics; computer science; course load; grading system; joint honours; math minor; new repeat rule; plan combinations; statistics); science (application for readmission and transfer students; aviation; physics and astronomy; reduced course load; rules for students enrolled in faculty of science courses); and software engineering.

TEXT MATCHING SOFTWARE

Council reviewed recommendations from the Office of Academic Integrity and Centre for Teaching & Learning regarding steps to be taken to allow Turnitin to be activated but not enabled by default in LEARN, which recommendations included draft text for insertion in the undergraduate calendar, course outline boilerplate, and the drop box to be checked in LEARN when enabling Turnitin. Council heard that Undergraduate Operations had already reviewed and approved the recommendations. Following discussion, Council passed a motion approving the recommendations.

Mario Coniglio
Associate Vice-President, Academic

/rmw

University of Waterloo
SENATE
Report of the President
20 November 2017

FOR INFORMATION

Recognition and Commendation

Six **HeForShe IMPACT scholarships** have been awarded to exceptional female students entering their first year as undergraduates in science, technology, engineering or mathematics (STEM). The scholarships are part of the University of Waterloo's commitment to encourage more young women to pursue fields in STEM, where females are currently underrepresented. Waterloo is the only Canadian university taking part in the UN Women's HeForShe IMPACT 10x10x10 initiative to achieve gender parity. As part of this initiative, the University aims increase female representation in STEM education and careers, enhance female faculty representation, and promote female leaders into senior university positions. The six scholarship recipients are: **Jiayue Cheng** (business and computer science [double major]), **Teresa Kang** (computer science), **Heather Musson** (software engineering), **Guia Janelle C. Pucyutan** (mathematical physics), **Alex Rynard** (mathematical physics), and **Christina Sullivan** (mechatronics engineering). (adapted from *Waterloo Stories*, 22 September 2017)

Associate Vice-President Human Rights, Equity and Inclusion **Diana Parry** was honoured as one to the Oktoberfest Rogers Women of the Year on October 5, 2017. The celebration "takes time out to recognize and pay tribute to outstanding women in the community." 44 women were nominated in ten categories. Parry was recognized in the Professional category, an award that "recognizes women for dedicating themselves to the pursuit of excellence in their chosen careers." (adapted from the *Daily Bulletin*, 6 October 2017)

Doctor of Pharmacy student **Munaza Saleem** was selected from an applicant pool of young women across Canada to step into the role of **Minister of National Defence** for a day. Saleem is part of the Canadian #GirlsBelongHere initiative and one of 17 youth who are paired with government leaders, CEOs, and executives to illustrate every girl's right to belong in influential roles. The Girls Belong Here campaign is to celebrate International Day of the Girl on October 11 and is part of Plan International's global initiative which has over 500 participants in 60 countries. The purpose of the campaign is to put young leaders in positions of power to inspire girls to break down gender barriers preventing them from following their dreams. Saleem was first involved with Plan International Canada as part of the Because I am a Girl Speaker's Bureau three years ago, where she delivered motivational speeches on female empowerment and creating positive change. (adapted from the *Daily Bulletin*, 12 October 2017)

A patch that delivers allergy medication to children developed by Waterloo students is one of only two Canadian projects to be shortlisted for this year's international James Dyson Awards competition. It's the fourth year in a row a University of Waterloo project has reached the final round. **Avro Life Science**, co-founded by **Shakir Lakhani**, a second-year nanotechnology engineering student, and **Keean Sarani**, a third-year science undergraduate and an incoming doctor of pharmacy student, has created an easy-to-use sticker that provides antihistamines to children through the skin and directly into the bloodstream. The patent-pending technology controls the release rate of the drug. Avro Life Science, now part of Velocity Science, won $25K in last December's Velocity Fund Finals for the startup's solution to provide an alternative form of allergy medication to children without the hassle of pills and syrups. Since 2014, Waterloo student projects have figured prominently in the contest started by James Dyson, the British inventor of the bagless Dyson vacuum cleaner. The international winner will be announced on October 26, 2017. (adapted from the *Daily Bulletin*, 23 October 2017)

Alice A. Kuzniar, University Research Chair and Professor of German and English, will be awarded the **Hans-Walz Research Prize** on 1 December 2017 at the Robert Bosch Haus in Stuttgart for her work on the history of homeopathy. *The Birth of Homeopathy out of the Spirit of Romanticism* was published by the University of Toronto Press in Spring 2017. The research for the book was generously supported by the Alexander von Humboldt Foundation, the Lois Claxton Humanities and Social Sciences Research Fund, and the Social Sciences

and Humanities Research Council. The bi-annual Hans-Walz Research Prize is internationally recognized and supports research into the history of homeopathy. It is awarded by the Institute for the History of Medicine, which belongs to the Robert Bosch Stiftung (Robert Bosch Foundation), and is also supported by the Hans-Walz Foundation, a part of the Robert Bosch Foundation. (adapted from the *Waterloo Centre for German Studies News*, 30 October 2017)

University of Waterloo
REPORT OF THE DEAN OF APPLIED HEALTH SCIENCES TO SENATE
November 20, 2017

FOR INFORMATION

A. APPOINTMENTS

Adjunct Appointments

Graduate Supervision

PATTE, Karen, Assistant Professor, School of Public Health and Health Systems, September 18, 2017 – August 31, 2019.

TAUSKELA, Joseph, Assistant Professor, School of Public Health and Health Systems, September 18, 2017 – December 31, 2018.

Postdoctoral Fellow Appointments

JUUTILAINEN, Sandra, School of Public Health and Health Systems, September 1, 2017 – August 31, 2018.

McDONALD, Alison, Department of Kinesiology, October 1, 2017 – September 30, 2018.

Changes in Appointments

Definite Term, Research

YAZDANI, Amin, Research Assistant Professor**,** Department of Kinesiology, October 1, 2017 – February 28, 2018, part-time at 40% salary.

Special Appointments

MacNEIL, Margaret, Lecturer, School of Public Health and Health Systems, January 1, 2018 – April 30, 2018.

James W.E. Rush, Dean
Faculty of Applied Health Sciences

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF THE FACULTY OF ARTS TO SENATE
November 20, 2017

FOR INFORMATION

A. APPOINTMENTS

Probationary Term

COX, Jordana (BA 2008 University of Toronto, PhD 2015 Northwestern University), Assistant Professor, Department of Drama & Speech Communication, August 1, 2017 to June 30, 2020. Jordana's scholarship bridges communication studies, performance history, and public humanities. She earned an Interdisciplinary Ph.D. in Theatre and Drama with a Graduate Certificate in Rhetoric and Public Culture. While at Northwestern, Jordana held a Graduate Fellowship in Northwestern's Brady Scholars Program in Ethics and Civic Life, and coordinated a range of experiential learning opportunities at the Center for Civic Engagement. She contributed to public history programming at the Jane Addams Hull-House Museum and the Block Museum, and helped organize Northwestern's first public humanities conference, *The Scholar in Public.*

Probationary Term - Change in Dates

THOMPSON, Jessica, Assistant Professor, Department of Fine Arts, *from* July 1, 2016 – June 30, 2019 *to* July 1, 2016 to June 30, 2020.

VOORHEES, Gerald, Assistant Professor, Department of Drama & Speech Communication, *from* July 1, 2016 – June 30, 2019 *to* July 1, 2016 to June 30, 2020.

Definite Term

CAREY, Kevin (BA 1999 DePaul University, MA 2008 PhD 2015 University of Illinois at Chicago), Lecturer, Department of Drama & Speech Communication, August 1, 2017 to July 31, 2020. Kevin is an interdisciplinary teacher-scholar whose work focuses on higher education and rhetorical theory. He has written about critical thinking discourses as constitutive rhetoric and is interested in collaborative inquiry with his students. Drawing on institutional histories, critical pedagogy, and philosophy, Kevin's research examines tensions between progressive aims and conservative functions of higher education, and he works on ways to create links between his research and what happens in the classroom.

SCHMIDLIN, Karin, (BA 1989 University of the Arts Zurich Switzerland, Master of Digital Media 2010 Centre for Digital Media, British Columbia), Lecturer, Faculty of Arts (Stratford campus), August 1, 2017 – July 31, 2019. Karin was an instructor at the British Columbia Institute for Technology for six years prior to joining UW as Manager and Lead Designer for the Virtual Incubation Program in the Conrad Business, Entrepreneurship and Technology Centre in 2012. She has been teaching on a sessional basis at the Stratford campus since 2012.

ZHANG-KENNEDY, Leah (BDes 2007 York University, MASc 2013 PhD 2017 Carleton University), Lecturer, Faculty of Arts, Stratford Programs, August 1, 2017 to July 31, 2019. A recent graduate of the PhD program in Computer Science at Carleton University, Leah will combine her academic training with professional experience as a graphic designer to teach in the areas of user experience, design, and human-computer interaction

Visiting

MAJIMA, Yoshimasa, Visiting Scholar, Department of Psychology, April 1, 2018 to March 31, 2019.

VALLE RUIZ, Cinthia, Visiting Scholar, School of Accounting and Finance, February 5, 2018 to May 25, 2018.

Adjunct – Graduate Supervision

MITCHELL, Audra, Associate Professor, Department of Political Science, September 1, 2017 to August 31, 2020.

REGAN, Joseph, Clinical Supervision, Department of Psychology, September 1, 2017 to August 31, 2018.

ZAYED, Richard, Assistant Professor, Department of Psychology, January 1, 2018 to August 31, 2018.

Adjunct Reappointments – Instruction

MURRAY, Neil, Lecturer, Department of Psychology, September 1, 2017 to December 31, 2017.

Adjunct Reappointments – Miscellaneous (research, consultations, etc.)

MACDONALD, Robert, Assistant Professor, Department of Anthropology, September 1, 2017 to August 31, 2020.

Adjunct Reappointments – Graduate Supervision

LIBBY, Theresa, Professor, School of Accounting and Finance, August 1, 2017 to December 31, 2018.

ORR, Elizabeth, Clinical Supervision, Department of Psychology, September 1, 2017 to August 31, 2018.

Graduate Students Appointed as Part-Time Lecturers

PENCOLE, Claire, Department of French Studies, September 1, 2017 to December 31, 2017.

B. ADMINISTRATIVE APPOINTMENTS

ANDRES, Greg, Associate Chair, Undergraduate Studies, Department of Philosophy, March 1, 2017 to March 31, 2017.

FRASER, Doreen, Associate Chair, Undergraduate Studies, Department of Philosophy, April 1, 2017 to August 31, 2017.

Administrative Reappointment

SCHMENK, Barbara, Associate Chair, Graduate Studies, Department of Germanic and Slavic Studies, January 1, 2018 to December 31, 2019.

Douglas M. Peers
Dean, Faculty of Arts

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF ENGINEERING TO SENATE
November 20, 2017

FOR INFORMATION

A. APPOINTMENTS

Probationary-Term Appointment

SAMUEL, Siby, Assistant Professor, Department of Systems Design Engineering, January 1, 2018 – June 30, 2021. PhD University of Massachusetts, Amherst, MA, USA 2014; B.Tech National Institute of Technology Karnataka, Surathkal, India 2009. Dr. Samuel's research focuses on the area of Human Factors, looking at the interactions between humans and their surroundings. In particular, his projects focus on automotive applications -- dealing with younger and older drivers, signage design, advanced in-vehicle technologies, road safety, and vehicle automation. His research therefore dovetails nicely between three areas of significance to Systems Design: human factors, automotive, and biomedical.

YIN, Shunde, Associate Professor, Department of Civil & Environmental Engineering, January 1, 2018 – June 30, 2021. PhD University of Waterloo 2008; MS Chinese Academy of Sciences, China 2003; BS Shijiazhuang Railway Institute, China 1999. Dr. Shunde Yin was appointed for the Geotechnical Engineering position because of his exceptional record of teaching and research, and his potential to continue growing as an outstanding teacher and researcher. Dr. Yin's research complements the expertise of the CEE department as well as the Earth and Environmental Sciences Department as his work has been focused on the numerical modeling of coupled processes that involve heat transfer, fluid flow, rock deforming and fracturing, and chemical reactions. His research addresses key issues in wellbore stability analysis, carbon dioxide geo-sequestration, and thermal reservoir recovery, all of which are active and growing areas of research funding. Dr. Yin has more than 40 peer-reviewed journal papers in well-recognized journals, and more than 20 conference publications. He has successfully secured funding in more than 10 grant proposals. Dr. Yin has participated in more than 15 international scientific committees and editorial boards for international conferences. He has served as reviewer for more than 14 international peer-reviewed journals.

Probationary-Term Reappointment

MONTESANO, Giovanni (John), Assistant Professor, Department of Mechanical & Mechatronics Engineering, July 1, 2018 – June 30, 2021. PhD Ryerson University 2012; MASc Ryerson University 2005; BEng Ryerson University 2003.

MUSSELMAN, Kevin, Assistant Professor, Department of Mechanical & Mechatronics Engineering, July 1, 2018 – June 30, 2021. PhD University of Cambridge, UK 2010; MSc University of British Columbia 2006; BSc Queen's University 2004.

New Definite Term – full-time

MANDAL, Kalikinkar, Research Assistant Professor, Department of Electrical & Computer Engineering, October 1, 2017 – September 14, 2019. PhD University of Waterloo 2013; MTech Indian Statistical Institute, India 2009; MSc Visva-Bharati University, India 2007; BSc University of Burdwan, India 2005. Dr. Mandal will be working with Guang Gong and Mark Aagaard on design and implementation of lightweight cryptography and secure protocols for the Internet of Things.

Visiting Appointments

ALMONEEF, Thamer, Scholar, Department of Electrical & Computer Engineering, September 29, 2017 – September 28, 2018.

HAN, Xiao Xia, Scholar, Department of Chemical Engineering, October 1, 2017 – September 30, 2018.

JIN, Yingai, Scholar, Department of Mechanical & Mechatronics Engineering, December 25, 2017 - June 24, 2018.

LEI, Haibo, Associate Professor, Department of Chemical Engineering, July 1, 2017 – June 30, 2018.

LIU, Peng, Associate Professor, Department of Electrical & Computer Engineering, September 22, 2017 – February 28, 2018.

MOHAMMADI, Mohammad Reza, Associate Professor, Department of Chemical Engineering, February 1, 2018 – January 31, 2019.

OZCAN, Seyma Nur, Scientist, Department of Electrical & Computer Engineering, October 16, 2017 – January 26, 2018.

SHEN, Jingfang, Scholar, Department of Mechanical & Mechatronics Engineering, September 30, 2017 – September 29, 2018.

YUAN, Kang, Scholar, Department of Mechanical & Mechatronics Engineering, November 15, 2017 – November 14, 2018.

Visiting Reappointments

KARIMINIAAE HAMEDAANI, Hamid-Reza, Associate Professor, Department of Chemical Engineering, October 1, 2017 – September 30, 2018.

Special Appointments

Undergraduate Instruction

APLEVICH, Dwight, Professor, Professor Emeritus, Lecturer, Department of Electrical & Computer Engineering, January 1, 2018 – April 30, 2018.

BREG, Justin, Lecturer, School of Architecture, September 1, 2017 – December 31, 2017.

GRIN, Aaron, Lecturer, School of Architecture, September 1, 2017 – December 31, 2017.

HASHEMI, Ehasan, Lecturer, Department of Mechanical & Mechatronics Engineering, September 1, 2017 – December 31, 2017.

Special Appointments

Graduate Instruction

BOLEN, Matthew, Lecturer, School of Architecture, September 1, 2017 – December 31, 2017.

GOODARZI, Avesta, Lecturer, Department of Mechanical & Mechatronics Engineering, September 1, 2017 – December 31, 2017.

MARTIN, Tim, Lecturer, Conrad Business Entrepreneurship & Technology Centre, September 1, 2017 – December 31, 2017.

Special Reappointments
Undergraduate Instruction
BISSETT, Tara, Lecturer, School of Architecture, September 1, 2017 – December 31, 2017.

Adjunct Appointments
Graduate Supervision and Research
FAKIH, Adel, Assistant Professor, Department of Systems Design Engineering, July 1, 2017 – June 30, 2020.

SABRY, Ramin, Professor, Department of Electrical & Computer Engineering, October 1, 2017 – September 30, 2020.

Adjunct Reappointments
Graduate Supervision & Research
DUEVER, Thomas, Professor, Department of Chemical Engineering, August 1, 2017 – July 31, 2020.

MCMANUS, Neil, Assistant Professor, Department of Chemical Engineering, September 1, 2017 – August 31, 2018.

PRESSE, Andre, Assistant Professor, Department of Systems Design Engineering, September 1, 2017 – August 31, 2020.

SIVA, Parthipan, Assistant Professor, Department of Systems Design Engineering, March 1, 2017 – February 28, 2020.

B. ADMINISTRATIVE APPOINTMENTS
BISHOP, William, Director of Admissions, Engineering Undergraduate Office, Dean of Engineering Office, September 1, 2018 – August 31, 2021.

BRUSH, David, Associate Chair, Undergraduate Studies, Department of Civil & Environmental Engineering, January 1, 2018 – December 31, 2018.

ADMINISTRATIVE REAPPOINTMENTS
ARMITAGE, Howard, Associate Director, Virtual Incubator Project, Conrad Business, Entrepreneurship & Technology Centre, September 1, 2017 – November 30, 2017.

GORBET, Maud, Director, Biomedical Engineering, Department of Systems Design Engineering September 1, 2017 – August 31, 2020.

THISTLE, John, Co-ordinator MEng Program, Department of Electrical & Computer Engineering, September 1, 2017 – August 1, 2018.

D. RETIREMENTS
WECKMAN, David, Professor, Department of Mechanical & Mechatronics Engineering, August 31, 2017.

E. SABBATICAL LEAVES

For Approval by the Board of Governors

FU, Liping, Professor, Department of Civil & Environmental Engineering, May 1, 2018 – April 30, 2019, twelve months at 85% salary.

PRITZKER, Mark, Professor, Department of Chemical Engineering, September 1, 2018 – August 31, 2019, twelve months at 85% salary.

Pearl Sullivan
Dean, Faculty of Engineering

University of Waterloo
REPORT OF THE DEAN OF ENVIRONMENT TO SENATE
November 20, 2017

FOR INFORMATION

A. APPOINTMENTS

Adjunct Appointments

Graduate Supervision

DICKINSON, Brock, Entrepreneur-in-Residence, Faculty of Environment, October 1, 2017 to September 30, 2018.

GREPIN, Karen, Associate Professor, Department of Geography and Environmental Management, August 1, 2017 to September 30, 2021.

KARANJA, Diana, Assistant Professor, Department of Geography and Environmental Management, August 1, 2017 to July 31, 2021.

MORTSCH, Linda, Graduate Committee Member, Department of Geography and Environmental Management, August 1, 2017 to July 31, 2022.

WITTENBRINCK, Joerg, Graduate Committee Member, Department of Knowledge Integration, September 1, 2017 to August 31, 2018.

Graduate Supervision and Research

RICHARDSON, Paul, Assistant Professor, School of Environment, Resources and Sustainability, October 1, 2017 to December 31, 2020.

SUFFLING, Roger, Professor, School of Planning, June 1, 2017 to May 31, 2019.

Special Appointments

Instruction

BEEBE, John, Lecturer, Department of Geography and Environmental Management, January 1, 2018 to April 30, 2018.

DAY, Daniel, Lecturer, School of Environment, Enterprise and Development, January 1, 2018 to April 30, 2018.

SOLLY, Jeffrey, Lecturer, School of Planning, January 1, 2018 to April 30, 2018.

SWERDFAGER, Trevor, Lecturer, Department of Geography and Environmental Management, January 1, 2018 to April 30, 2018.

Graduate Student Appointed as Part-Time Lecturer

MAY, Bradley, Lecturer, Department of Geography and Environmental Management, January 1, 2018 to April 30, 2018.

Jean Andrey
Dean

University of Waterloo
REPORT OF THE DEAN OF MATHEMATICS TO SENATE
November 20, 2017

FOR INFORMATION

A. **APPOINTMENTS** (approved by the Board of Governors)

Probationary-Term Reappointments

SATRIANO, Matthew, Assistant Professor, Dept. of Pure Mathematics, July 1, 2018 – June 30, 2021.

Definite Term - Reappointments

PEI, Martin, Lecturer, Dept. of Combinatorics and Optimization, December 31, 2017 – December 30, 2018.

Visiting Appointments

BINGOL, Haluk (Bogazici University), Office of the Dean, August 21, 2017 – August 31, 2018.

LEVINE, Zachariah, Research Associate, David R. Cheriton School of Computer Science, September 1, 2017 – August 31, 2018.

MARTIN, Robert, Research Associate, Dept. of Applied Mathematics, October 1, 2017 – March 31, 2018.

SCHLUNTZ, Robert, Research Associate, David R. Cheriton School of Computer Science, September 1, 2017 – December 31, 2017.

Adjunct Reappointments

Instructor

AKINYEMI, John, Lecturer, David R. Cheriton School of Computer Science, September 1, 2017 – December 31, 2017.

BURGER, Reinhold, Lecturer, David R. Cheriton School of Computer Science, January 1, 2018 – April 30, 2018.

GOH, Joslin, Lecturer, Dept. of Statistics and Actuarial Science, September 1, 2017 – December 31, 2017.

HASAN, Khalad, Lecturer, David R. Cheriton School of Computer Science, January 1, 2018 – April 30, 2018.

KHARAL, Rosina, Lecturer, David R. Cheriton School of Computer Science, January 1, 2018 – April 30, 2018.

IBRAHIM, Ahmed, Lecturer, David R. Cheriton School of Computer Science, September 1, 2017 – December 31, 2017.

KHARAL, Rosina, Lecturer, David R. Cheriton School of Computer Science, September 1, 2017 – December 31, 2017.

KOBYZEV, Ivan, Lecturer, Office of the Dean, September 1, 2017 – December 31, 2017.

KOHLER, Dave, Lecturer, Dept. of Statistics and Actuarial Science, September 1, 2017 – December 31, 2017.

LANCTOT, Kevin, Lecturer, David R. Cheriton School of Computer Science, September 1, 2017 – December 31, 2017.

LENNOX, Scott, Lecturer, Dept. of Statistics and Actuarial Science, September 1, 2017 – December 31, 2017.

McLEISH, Don, Lecturer, Dept. of Statistics and Actuarial Science, September 1, 2017 – December 31, 2017.

RADOCCHIA, Joseph, Lecturer, Office of the Dean, September 1, 2017– December 31, 2017.

RADOCCHIA, Joseph, Lecturer, Office of the Dean, January 1, 2018 – April 30, 2018.

SOHAIL, Nasir, Lecturer, Office of the Dean, September 1, 2017 – December 31, 2017.

YOAV, Len, Lecturer, Dept. of Combinatorics and Optimization, September 1, 2017 – December 31, 2017.

ZIMA, Eugene, Lecturer, David R. Cherition School of Computer Science, September 1, 2017 – December 31, 2017.

Research

JACKSON, David, Professor Emeritus, Dept. of Combinatorics and Optimization, September 1, 2017 – August 31, 2020.

MURTY, Uppaluri, Professor Emeritus, Dept. of Statistics and Actuarial Science, July 1, 2017 – August 31, 2020.

PALDUS, Josef, Professor Emeritus, Dept. of Applied Mathematics, September 1, 2017 – August 31, 2020.

TOMPA, Frank, Professor Emeritus, David R. Cheriton School of Computer Science, July 1, 2017 – June 30, 2020.

YOUNGER, Daniel, Professor Emeritus, Dept. of Combinatorics and Optimization, July 1, 2017 – June 30, 2017.

Cross Appointments

DOW, Christine (Assistant Professor, Geography and Environmental Management), in the Dept. of Applied Mathematics, July 1, 2017 – June 30, 2020).

SCOTT, Andrea (Assistant Professor, Systems Design Engineering), in the Dept. of Applied Mathematics, July 1, 2017 – June 30, 2020.

Graduate Students appointed as Part-time Lecturers
BOYU, Li, Dept. of Pure Mathematics, September 1, 2017 – December 31, 2017.

CRAMER, Zachary, Dept. of Pure Mathematics, September 1, 2017 – December 31, 2017.

GRANVILLE, Kevin, Dept. of Statistics and Actuarial Science, September 1, 2017 – December 31, 2017.

TANG, Junsen, Dept. of Statistics and Actuarial Science, September 1, 2017 – December 31, 2017.

WONG, Tsun Yu Jeff, Dept. of Statistics and Actuarial Science, September 1, 2017 – December 31, 2017.

Graduate Students reappointed as Part-time Lecturers
AlREFAI, Ahmad Salam, David R. Cheriton School of Computer Science, September 1, 2017 – December 31, 2017.

DEVEAU, Michael, Dept. of Pure Mathematics, September 1, 2017 – December 31, 2017.

KABIR, Ifaz, David R. Cheriton School of Computer Science, September 1, 2017 – December 31, 2017.

LERMAN, Michael, David R. Cheriton School of Computer Science, September 1, 2017 – December 31, 2017.

TSANG, Alan, David R. Cheriton School of Computer Science, September 1, 2017 – December 31, 2017.

Postdoctoral Fellow reappointed as part-time Lecturers
ALEYASIN, Ali, Dept. of Pure Mathematics, September 1, 2017 – August 31, 2019.

BISLIMOVSKA, Bojana, David R. Cheriton School of Computer Science, October 1, 2017 – September 30, 2018.

JAMSHIDPEY, Armin, David R. Cheriton School of Computer Science, October 1, 2017 – September 30, 2018.

KHAN, Hassan, David R. Cheriton School of Computer Science, September 1, 2017 – August 31, 2018.

B. RETIREMENT
DiMARCO, Chrysanne, Associate Professor, David R. Cheriton School of Computer Science, December 31, 2018.

C. SABBATICALS (approved by the Board of Governors)
HARE, Kathryn (Professor), Dept. of Pure Mathematics, September 1, 2018 – February 28, 2019, with 85% salary.

KESHAV, Srinivasan (Professor), David R. Cherition School of Computer Science, January 1, 2018 – December 31, 2018 at 100% salary.

LIU, Xinzhi (Professor), Dept. of Applied Mathematics, January 1, 2018 – December 31, 2018 with 85% salary.

MENEZES, Alfred (Professor), Dept. of Combinatorics and Optimization, July 1, 2018 – December 31, 2018 at 85% salary.

SIEGEL, David (Professor), Dept. of Applied Mathematics, January 1, 2018 – June 30, 2018, with 100% salary.

C.1. Change
BAUCH, Christopher (Professor), Dept. of Applied Mathematics, at 100% salary (*ref.* Dean's Report to Senate, June 2017)
From January 1, 2018 – June 30, 2018
To July 1, 2018 – December 31, 2018

D. SPECIAL LEAVE

De STERCK, Hans, Professor, Dept. of Applied Mathematics, October 1, 2017 – December 31, 2017. This is an unpaid leave

HAN, Peisong, Assistant Professor, Dept. of Statistics and Actuarial Science, January 1, 2018 – December 31, 2018. This is an unpaid leave.

WILLARD, Ross, Professor, Dept. of Pure Mathematics, January 1, 2018 – April 30, 2018. This is an administrative leave.

Stephen M. Watt
Dean

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF SCIENCE TO SENATE
November 20, 2017

For information:

A. *APPOINTMENTS*

Tenured

PERCIVAL, Will, Professor, Department of Physics and Astronomy, March 1, 2018. [B.Sc., Mathematics, University of Nottingham (1995); Ph.D., Oxford University (1999).] Professor Will Percival is currently at the University of Portsmouth, UK and is a world renowned Cosmologist. Professor Percival is a leader in the use of large-scale telescopic surveys of distant galaxies to study the origins of dark matter and dark energy in the Universe. Professor Percival will hold the Distinguished Research Chair in Astrophysics, funded in part through a generous gift from Mike and Ophelia Lazaridis. Dr. Percival will serve as the founding director of a new astrophysical institute at Waterloo which will host a hive of postdoctoral researchers and students. He will work closely between the Department of Physics and Astronomy and Perimeter Institute for Theoretical Physics to form the strongest research centre in astrophysics in Canada and one of the strongest in the world.

New Definite Term Full-Time

CONANT JR., Brewster, Lecturer, Department of Earth and Environmental Sciences, September 1, 2017 to August 31, 2018. [B.Sc., Brown University (1984); M.Sc., University of Waterloo (1991); Ph.D., University of Waterloo (2001).] Dr. Brewster Conant is a field-based hydrogeologist with expertise in groundwater-surface water interaction processes, field site characterization and groundwater contamination. He has extensive experience in teaching field laboratory courses in hydrology and hydrogeology as well as introductory geology and hydrology classroom courses. He will be directly involved in teaching and managing several of the field laboratory courses and will also contribute to teaching within the undergraduate Earth Sciences curriculum. It is also anticipated that Dr. Conant will become involved in the development of new on-line course offerings that are being considered within the Earth and Environmental Sciences curriculum.

REZANEZHAD, Fereidoun, Assistant Professor, Department of Earth and Environmental Sciences, September 1, 2017 to August 31, 2018. [B.Sc., University of Tabriz (1998); M.Sc., University of Sistan and Baluchestan (2000); Ph.D., University of Heidelberg (2007).] Dr. Fereidoun Rezanezhad is a biogeochemist and hydrologist working in the area of Ecohydrology. His research work focuses on contaminant reactive processes in the shallow subsurface at the field and laboratory scale. He will be engaged in teaching physical hydrogeology and reactive transport modelling within the undergraduate and graduate programs in Earth and Environmental Sciences and will maintain an international research program with a diverse funding base.

Adjunct Appointments
Graduate Supervision

WU, Lingling, Assistant Professor, Department of Earth and Environmental Sciences, September 1, 2017 to August 31, 2018.

Graduate Supervision and Research

HSIEH, Timothy, Assistant Professor, Department of Physics and Astronomy, April 1, 2018 to August 31, 2023.

Adjunct Reappointments
Undergraduate Instruction

BARRETT, Brett, Assistant Professor, School of Pharmacy, January 1, 2018 to December 31, 2020.

COULSTON, Barbara, Assistant Professor, School of Pharmacy, January 1, 2018 to December 31, 2020.

DELUCO, Carla, Clinical Assistant Professor, School of Pharmacy, September 1, 2018 to December 31, 2020.

Graduate Supervision

LAVERMAN, Anniet, Professor, Department of Earth and Environmental Sciences, June 1, 2017 to May 31, 2020.

WU, Jingcun (Jeff), Assistant Professor, Department of Chemistry, September 1, 2017 to August 31, 2020.

Graduate Supervision and Research

GHOSE, Shohini, Professor, Department of Physics and Astronomy, January 1, 2018 to August 31, 2023.

LEE, Lucila (Lucy), Professor, Department of Biology, November 1, 2017 to October 31, 2020.

SIEMANN, Stefan, Associate Professor, Department of Chemistry, September 1, 2017 to August 31, 2020.

VIEIRA, Pedro G.M., Associate Professor, Department of Physics and Astronomy, September 1, 2017 to August 31, 2022.

WOLFE, Brent, Professor, Department of Biology, December 1, 2017 to November 30, 2020.

Undergraduate Instruction and Graduate Instruction

CALLENDER, Murchison, (Professor Emeritus), Professor, School of Optometry and Vision Science, November 1, 2017 to October 31, 2020.

Research and Other

LEE, Linda L.-W., Assistant Professor, School of Pharmacy, November 1, 2017 to October 31, 2020.

Graduate Instruction, Graduate Supervision and Research

DITTRICH, Bianca, Assistant Professor, Department of Physics and Astronomy, September 1, 2017 to August 31, 2022.

SPEKKENS, Robert, Assistant Professor, Department of Physics and Astronomy, November 1, 2017 to October 31, 2022.

Cross Appointment

IGBOELI, Okechukwu, Lecturer, Dean of Science Office cross appointed to Department of Biology, October 1, 2017 to September 30, 2020.

ZHAO, Boxin, Associate Professor, Department of Chemical Engineering cross appointed to Department of Chemistry, September 1, 2017 to August 31, 2020.

Cross Reappointments

KEMPF, Achim, Professor, Department of Applied Mathematics cross appointed to Department of Physics and Astronomy, September 1, 2017 to August 31, 2022.

POULIN, Francis Joseph, Associate Professor, Department of Applied Mathematics cross appointed to Department of Physics and Astronomy, September 1, 2017 to August 31, 2020.

WETTIG, Shawn, Associate Professor, School of Pharmacy cross appointed to Department of Chemistry, September 1, 2017 to August 31, 2020.

Special Reappointments
Undergraduate Instruction

ABUZAITER, Wesam, Lecturer, School of Pharmacy, September 1, 2017 to December 31, 2017.

HRYCYSHYN, Matthew, Lecturer, Department of Biology, September 1, 2017 to December 31, 2017.

B. ADMINISTRATIVE REAPPOINTMENTS

BALOGH, Michael, Associate Chair, Department of Physics and Astronomy, September 1, 2017 to August 31, 2020.

CHRISTIAN, Lisa, Associate Director, Clinics, School of Optometry and Vision Science, September 1, 2017 to August 31, 2018.

FOR APPROVAL BY THE BOARD OF GOVERNORS

C. SABBATICAL

HONEK, John, Professor, Department of Chemistry, Four for Four Administrative Leave, September 1, 2018 to December 31, 2018, 100% salary arrangements, followed by regular sabbatical leave, January 1, 2019 to December 31, 2019, 100% salary arrangements.

HUTCHINGS, Natalie, Associate Professor, School of Optometry and Vision Science, January 1, 2018 to June 30, 2018, 100% salary arrangements.

SERVOS, Mark, Professor, Department of Biology, January 1, 2018 to December 31, 2018, 100% salary arrangements.

SIMPSON, Trefford, Professor, School of Optometry and Vision Science, January 1, 2018 to December 31, 2018, 100% salary arrangements.

R.P. Lemieux
Dean

University of Waterloo
SENATE EXECUTIVE COMMITTEE
Report to Senate
20 November 2017

The position of "Associate Provost, Resources" is being eliminated, and with the establishment of the position of "Deputy Provost, Integrated Planning and Budgeting", it is proposed that Senate Bylaw 4: a bylaw relating to the naming of additional *ex officio* members of Senate of the University of Waterloo (Attachment #1) be amended. The proposed change does not change the constituency ratios and so there are no other changes necessary to Senate representation.

There are a number of other small housekeeping items as a result of this change, and to other titles in all of Senate's bylaws (Attachments #2, 3, and 4).

In accordance with Section 14* of Bylaw 1: A bylaw relating generally to the business and affairs of Senate of the University of Waterloo, and its committees and councils, the bylaw changes are recommended to Senate for first reading at the 20 November 2017 meeting.

For Approval

Motion: That Senate receive the proposed bylaw changes for first reading at its 20 November 2017 meeting.

**The passage of a new bylaw or amendment(s) to an existing bylaw is accomplished in two readings by Senate. At the first reading, such discussion as is deemed appropriate by Senate shall take place. At the second reading, further discussion may take place and the vote on the document shall be taken. The two readings shall take place at different, but not necessarily consecutive, meetings of Senate.*

Feridun Hamdullahpur
President

Attachment #1

Senate Bylaw 4

A bylaw relating to the naming of additional *ex officio* members of Senate of the University of Waterloo.

BE IT ENACTED as a bylaw of Senate of the University of Waterloo, as follows:

1. *Ex officio* members

WHEREAS *The University of Waterloo Act, 1972* provides in section 18.a.9 that Senate of the university may add to its membership such other *ex officio* members as Senate by bylaw may, from time to time, designate; and

WHEREAS *The University of Waterloo Act, 1972* provides in section 18.b.2 that elected members of the faculty shall equal in number one more than the total number of all other members of Senate; and

WHEREAS *The University of Waterloo Act, 1972* provides in section 18.c. that upon the designation of and addition, from time to time, by Senate of any additional *ex officio* members, the number of elected members from the Board of Governors, the undergraduate students, the graduate students and the alumni shall be increased by whatever numbers are necessary to retain the ratios, in each case, of the number of such elected persons to the number of elected faculty.

BE IT THEREFORE enacted as a bylaw of Senate of the University of Waterloo as follows:

That the following be named as *ex officio* members of Senate:

a. The vice-president, advancement.
b. The vice-president, university relations.
c. The vice-president, university research.
d. The associate vice-president, academic.
~~e. The associate provost, resources.~~
e. The deputy provost, integrated planning and budgeting
f. The president of the Faculty Association of the University of Waterloo.
g. The president of the Federation of Students, University of Waterloo.
h. The president of the Graduate Student Association - University of Waterloo.

That the chief returning officer be empowered upon passage of this bylaw to take whatever steps are necessary to carry out such elections or by-elections as may be necessary to comply with the provisions of *The University of Waterloo Act, 1972*, cited above and arising from the designation of *ex officio* members of Senate by the passage or amendment of this bylaw.

Approved by Senate 20 May 1975.
Amended by Senate in two readings, December 1980 and January 1981.
Amended by Senate in two readings, December 1983 and January 1984.
Amended by Senate in two readings, May and June 1987.
Amended by Senate in two readings, May and June 1990.
Amended by Senate in two readings, October and November 2012.
Amended by Senate in two readings, November 2013 and January 2014.

Amended from Bylaw 11 by Senate in two readings, September and October 2014.
Amended by Senate in two readings, March and May 2015.

Attachment #2

Senate Bylaw 1

A bylaw relating generally to the business and affairs of Senate of the University of Waterloo, and its Committees and Councils.

BE IT ENACTED as a bylaw of Senate of the University of Waterloo, as follows:

1. Interpretation

1.01		In all the bylaws of Senate,
	a.	"academic year" means the twelve-month period dating from 1 May of one year to 30 April of the succeeding year.
	b.	"Senate" means Senate of the University of Waterloo.
	c.	"Executive Committee" means the Executive Committee of Senate as established in the Senate bylaws.
1.02		Throughout all the bylaws of Senate of the University of Waterloo:
	a.	Where the title "president" appears, an acting president or president pro tem, so designated by the Board of Governors, shall serve in the place of the president, with the latter's full rights and responsibilities.
	b.	Where the title "vice-president, academic & provost" appears, an acting vice-president, academic & provost or vice-president, academic & provost pro tem, so designated by the president and/or the Board of Governors, shall serve in the place of the vice-president, academic & provost, with the latter's full rights and responsibilities.
	c.	Where the title "vice-president, administration & finance" appears, an acting vice-president, administration & finance or vice-president, administration & finance pro tem, so designated by the president, shall serve in the place of the vice-president, administration & finance, with the latter's full rights and responsibilities.
	d.	Where the title "vice-president, advancement" appears, an acting vice-president, advancement or vice-president, advancement pro tem, so designated by the president, shall serve in the place of the vice-president, advancement, with the latter's full rights and responsibilities.
	e.	Where the title "vice-president, university relations" appears, an acting vice-president, university relations or vice-president, university relations pro tem, so designated by the president, shall serve in the place of the vice-president, university relations, with the latter's full rights and responsibilities.
	f.	Where the title "vice-president, university research" appears, an acting vice-president, university research or vice-president, university research pro tem, so designated by the president and/or the Board of Governors, shall serve in the place of the vice-president, university research, with the latter's full rights and responsibilities.
	g.	Where the title "associate vice-president, academic" appears, an acting associate vice-president, academic or associate vice-president, academic pro tem, so named to serve by the president, shall serve in the place of the associate vice-president, academic, with the latter's full rights and responsibilities.
	h.	Where the title ~~"associate provost, graduate studies"~~ "associate vice-president, graduate studies and postdoctoral affairs appears, an acting ~~associate provost, graduate studies~~ associate vice-president, graduate studies and postdoctoral affairs or ~~associate provost, graduate studies~~ associate vice-president, graduate studies and postdoctoral affairs pro tem, so named to serve by the president, shall serve in the place of the ~~associate provost, graduate studies~~ associate vice-

		president, graduate studies and postdoctoral affairs, with the latter's full rights and responsibilities.
	i.	Where the title ~~"associate provost, resources"~~ "deputy provost, integrated planning and budgeting" appears, an acting ~~associate provost, resources~~ deputy provost, integrated planning and budgeting or ~~associate provost, resources~~ deputy provost, integrated planning and budgeting pro tem, so designated by the president, shall serve in the place of the ~~associate provost, resources~~deputy provost, integrated planning and budgeting, with the latter's full rights and responsibilities.
	j.	Where the titles "dean of each faculty" appear, an acting dean, or dean pro tem, so named to serve by the vice-president, academic & provost, shall serve in the place of the dean, with the latter's full rights and responsibilities.

2. Schedule of meetings

2.01	The schedule of meetings for Senate and its committees and councils shall be approved by the chair of Senate and published by the Secretariat ~~& Office of General Counsel~~ prior to the new academic year.

3. Meetings of Senate

3.01	**General meetings** Senate shall normally hold ten (10) general meetings during each academic year. Notice of each meeting shall be communicated to the university community in such places and ways as may be designated from time to time by Senate.
3.02	**Place of meetings** Meetings of Senate shall be held upon the campus of the university.
3.03	**Notice of an agenda and background material for general meetings** Notice in writing of each general meeting and the agenda and available background material for any such meeting, shall be available to all members of Senate at least seven (7) days prior to the date of each such meeting.
3.04	**Special meetings** Special meetings of Senate shall be called by one of the following: The chair of Senate, upon the receipt of a request of the Executive Committee for such meeting; or The secretary of Senate, upon receipt by the secretary of a written request for such meeting signed by at least twenty (20) members of Senate, with such request to state the reason for calling the special meeting. Special meetings shall be called promptly. Notice in writing of each special meeting, together with the agenda and available background material shall be available to each member of Senate at least seven (7) days prior to the date of the meeting, provided that the chair of Senate shall have the power and authority to abridge such seven-

	day period when, in the chair's absolute discretion, the urgency of any item of business to be dealt with at such meeting so requires. Notice in writing of each special meeting shall be communicated to the university community in such places and ways as may be designated from time to time by Senate.

4. Committees and councils - agenda and background material to be available

4.01	Notice in writing of each general meeting of any committee or council shall be available at least seven (7) days prior to the date of each such meeting.
4.02	The agenda and available background material for any general meeting of any committee or council shall be available at least seven (7) days prior to the date of each such meeting.

5. Quorum

5.01	At all meetings of Senate and of its committees and councils, a majority of the members shall constitute a quorum for the transaction of the business and affairs of the body.

6. Meetings in open session

6.01	Subject to section 7 of this bylaw, all general and special meetings of Senate and its committees and councils shall be open to members of the university community, the public-at-large, and representatives of the news media. Senate will make every effort to hold its meetings in a room sufficiently large to accommodate those who indicate to the secretary of Senate, two full working days in advance of the meeting, their desire to attend.
6.02	Non-members in attendance at meetings shall not disrupt the proceedings of the meeting nor cause any disturbance by unreasonable noise or vocal expression. The chair may remove any such person when, in the chair's sole judgment, such person is engaging in improper or disruptive conduct that is detrimental to Senate carrying out its business.

7. Meetings in closed session

7.01	Notwithstanding the provisions of section 6 of this bylaw, and provided that all meetings shall begin in open session, Senate and its committees and councils shall have the right to hold any meeting or part thereof in closed session. This provision may exclude therefrom all persons, save for members and such resource persons as may be agreed should be in attendance, for the purpose of considering confidential financial matters of the university or where intimate financial or personal matters of any person may be disclosed, unless such person requests that such part of the meeting be open to the public. The Executive Committee shall determine for purposes of the Senate agenda whether any matter is of a confidential nature and such matter shall be so designated on the agenda for such Senate meeting and shall be designated and described in a manner consistent with maintaining the confidentiality of such matter. The chair or chair(s) of any committee or council of Senate will determine whether any matter is of a confidential nature and such matter shall be so designated on the agenda for such meeting and

	shall be designated and described in a manner consistent with maintaining the confidentiality of such matter. Senate or its committees or councils shall initially deal with any such confidential matter in closed session, but, after receiving the pertinent information relative to the confidential matter, may direct that the matter be thereupon considered in open session.

8. Declarations of conflict of interest

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

9. Representations to meetings

9.01	Any members of the university community, or of the public-at-large, wishing to make representations to any meeting of a committee or council shall file with the secretary of the relevant committee or council, at least two full working days prior to the date of such proposed meeting, written notice to that effect with such notice to designate the nature of the proposed representations.

10. Time limit on representations

10.01	The chair of any committee or council may limit the time to be allotted to members of the university community and the public-at-large for committee or council representations.

11. Secretary

11.01	The university secretary ~~and general counsel (USGC) of the university~~ shall be the non-voting secretary of Senate.

11.02	The ~~USGC~~ university secretary shall appoint one or more associate secretaries of Senate to act as secretary of Senate in the absence of the ~~USGC~~university secretary.
11.03	The ~~USGC~~university secretary, or designate, shall be the non-voting secretary of each committee or council of Senate.

12. Limit on service on committees

12.01	An elected member of Senate shall not serve on more than one of the Executive, Finance or Long Range Planning Committees.

13. Term of office

13.01	Except where specified by Senate bylaws, the term of office on committees or councils shall be one year, with members eligible for re-election.

14. Bylaws - general

14.01	The passage of a new bylaw or amendment(s) to an existing bylaw is accomplished in two readings by Senate. At the first reading, such discussion as is deemed appropriate by Senate shall take place. At the second reading, further discussion may take place and the vote on the document shall be taken. The two readings shall take place at different, but not necessarily consecutive, meetings of Senate.
14.02	No proposed bylaw or amendment(s) will be given reading unless it has been bound into or accompanies the agenda portfolio distributed in advance of the meeting.
14.03	Any proposed bylaw or amendment(s) shall include the proposed wording of the bylaw or amendment(s), and where appropriate, a summary of the reasons for such bylaw or amendment(s).
14.04	In order to be approved by Senate, any new bylaw or amendment(s) to bylaws must receive the affirmative vote of at least two-thirds of the members of Senate present and voting at the meeting.

15. Faculty constitutions

15.01	Each faculty and each academic department and school of the university may adopt a formal constitution governing its operations, provided that each such constitution and any amendments thereto shall be inoperative and ineffective until approved by Senate. No provision of the constitutions shall be inconsistent with any provisions of *The University of Waterloo Act, 1972*, as amended, and no provision of any constitution shall be exempt from the provisions of any of the bylaws or established policies of the university which are within the final jurisdiction of Senate, except as expressly approved by Senate.

Amended/consolidated from Bylaws 1, 6, 7, and 10 in two readings in September and October 2014.

Attachment #3

Senate Bylaw 2

A bylaw to establish Committees and Councils of Senate of the University of Waterloo.

BE IT ENACTED as a bylaw of Senate of the University of Waterloo, as follows:

1. Executive Committee

1.01	There shall be a standing committee of Senate called the Executive Committee.
1.02	**Executive Committee Membership** The membership of this committee shall consist of the following: *Ex Officio* The president of the university, who shall chair this committee. The vice-president, academic & provost. The ~~associate provost, graduate studies.~~ associate vice-president, graduate studies and postdoctoral affairs The president of the Faculty Association of the University of Waterloo. Elected One faculty member of Senate from each faculty of the university. Three members from the student members of Senate, at least one of whom shall be an undergraduate student and at least one of whom shall be a graduate student. One member of Senate from among the community-at-large members of the Board of Governors. One faculty member of Senate from the affiliated and federated institutions of Waterloo. One member from among the alumni members of Senate.
1.03	The term of office of members elected pursuant to paragraph 1.02.b shall be one year. Each member is eligible for re-election.
1.04	**Powers and duties of Executive Committee** The Executive Committee shall have the following powers and duties: To request special meetings of Senate, in accordance with Senate Bylaw 1. On those occasions when the agenda does not, in the estimation of the Executive Committee, warrant a meeting of Senate, to cancel any such meeting of Senate, and to exercise the powers of Senate, within the limits of *The University of Waterloo Act, 1972*, on all matters considered by the Executive Committee in its discretion to be of sufficient urgency that they must be decided prior to the next regular meeting of Senate, provided that the Executive Committee shall have no power under any circumstances to repeal, amend or modify Senate bylaws, or to exercise Senate's responsibilities under Policies 45, 48, 50 and 68. All such actions are to be reported to Senate. To prepare the agenda for all regular and special meetings of Senate. To receive and review reports from the deans of the university prior to their submission to Senate at each regular meeting. To present to Senate, normally at the last regular meeting in the academic year in April, a list of nominations for the committees and councils of Senate.

	To make recommendations to Senate as may be necessary from time to time regarding the establishment of ad hoc committees of Senate, such recommendations to include the terms of reference of any such committee and a list of nominations for the membership thereof. To receive and review the reports and recommendations of all committees and councils, prior to their presentation to Senate and to make at its discretion recommendations to Senate thereon. To act on behalf of Senate on such matters as Senate may from time to time designate. To report to Senate, as expeditiously as possible, with respect to the conduct of such matters as shall be delegated by Senate to the committee from time to time.
1.05	**Meetings of the Executive Committee** The committee shall normally hold ten (10) regular meetings during each academic year, each such meeting to be held approximately two weeks prior to the date of each general meeting of Senate. Special meetings of the committee shall be called by the chair of the committee.

2. Finance Committee

2.01	There shall be a standing committee of Senate called the Finance Committee.
2.02	**Finance Committee Membership** The membership of this committee shall consist of the following: *Ex Officio* The president of the university, who shall chair this committee. The vice-president, academic & provost. The vice-president, administration & finance. The vice-president, university research. The ~~associate provost, graduate studies.~~ associate vice-president, graduate studies and postdoctoral affairs The ~~associate provost, resources.~~ deputy provost, integrated planning and budgeting The dean of each faculty. Elected One member from the community-at-large members of the Board of Governors. One elected faculty member of Senate from each faculty and one faculty member of Senate from the affiliated and federated institutions of Waterloo. Three members from the elected student members of Senate, at least one of whom shall be an undergraduate student and at least one of whom shall be a graduate student. One member from among the alumni members of Senate.
2.03	The term of office of members elected pursuant to paragraph 2.02.b shall be one year. Each member is eligible for re-election.
2.04	**Powers and Duties of Finance Committee** The Finance Committee shall have the following powers and duties: To consider, study, and review all matters pertaining to the financial operations of the university and to make recommendations to Senate thereon.

	To consider, study, and review the general policies governing the internal allocation of the university's financial resources and to make recommendations to Senate thereon. To receive each year from the vice-president, academic & provost, for consideration, study, and review, on behalf of Senate, a detailed operating budget for the university and to make recommendations to Senate thereon.

3. Long Range Planning Committee

3.01	There shall be a standing committee of Senate called the Long Range Planning Committee.
3.02	**Long Range Planning Committee Membership** The membership of this committee shall consist of the following: *Ex Officio* The president of the university. The vice-president, academic & provost, who shall chair this committee. The vice-president, administration & finance. The vice-president, university research. The ~~associate provost, graduate studies.~~ associate vice-president, graduate studies and postdoctoral affairs The ~~associate provost, resources.~~deputy provost, integrated planning and budgeting The dean of each faculty. Elected One elected faculty member of Senate from each faculty and one faculty member of Senate from the affiliated and federated institutions of Waterloo. One member from the Board of Directors of the Faculty Association of the University of Waterloo. Three members of Senate from the elected student members, at least one of whom shall be an undergraduate student and at least one of whom shall be a graduate student. One member of Senate from the community-at-large members of the Board of Governors. One member from among the alumni members of Senate.
3.03	The term of office of members elected pursuant to paragraph 3.02.b shall be one year. Each member is eligible for re-election.
3.04	**Powers and duties of Long Range Planning Committee** The Long Range Planning Committee shall have the following powers and duties: To make recommendations to Senate in all matters pertaining to the co-ordination of the planning of the academic, physical, and operational development of the university and the achievement of a planned rate and scope of such development. To receive from the president, for consideration, study and review, on behalf of Senate, plans for the development of the university and to make recommendations to Senate thereon. To undertake such studies as Senate may designate from time to time. To report to Senate, as expeditiously as possible, with respect to the conduct of such matters as shall be delegated by Senate to the committee from time to time.

4. Graduate & Research Council

4.01	There shall be a council of the university, appointed by and responsible to Senate, called the Graduate & Research Council.
4.02	**Graduate & Research Council Membership** The membership of this council shall consist of the following: *Ex Officio* The president of the university. The vice-president, academic & provost. The vice-president, university research, who shall co-chair this council. The ~~associate provost, graduate studies,~~associate vice-president, graduate studies and postdoctoral affiars, who shall co-chair this committee. The associate dean of graduate studies in the graduate studies and postdoctoral affairs office. The associate vice-president, university research. The associate vice-president, external research. The chief ethics officer. The director, research partnerships. The director, graduate academic services. The university librarian, or designate. The president of the Graduate Student Association. Elected / Appointed Two faculty members with Approved Doctoral Dissertation Supervisor status from each faculty, one of whom must be an associate dean with a research and/or graduate studies portfolio. Associate deans serve without term limits; others serve for a two-year term. One faculty member from the affiliated and federated institutions of Waterloo, who shall serve for a term of two years. One graduate student from each faculty, each of whom shall serve for a term of two years.
4.03	**Powers and Duties of the Graduate & Research Council** The Graduate & Research Council shall consider all questions relating to the academic quality of graduate studies and research activity within the university and, without intending to restrict the generality of the foregoing, the Graduate & Research Council shall, Make recommendations to Senate with respect to the government, direction and management of, or any changes in rules, regulations or policies for graduate studies and research in the university. Advise the vice-president, academic & provost on all matters relating to graduate studies and research. Receive, consider, study and review briefs on any aspect of graduate studies and research from members of the university. Make recommendations to Senate with respect to any financial matter pertaining to graduate studies and research. Consider, study and review all proposals for new graduate programs, the deletion of graduate programs, major changes to existing graduate programs, arrange for internal appraisals as the council shall see fit, and make recommendations to Senate thereon.

	On behalf of Senate, consider and approve all new graduate courses, the deletion of graduate courses, and proposed minor changes to existing graduate courses and programs, and provide Senate with a brief summary of council's deliberations in this regard. Any matter of controversy that might arise may be referred to Senate. Consider, study and review all proposals for new centres and institutes, and the closure of centres and institutes, and make recommendations to Senate thereon. On behalf of Senate, consider and approve renewals for centres and institutes, and report such renewals to Senate for information. Any matter of controversy that might arise may be referred to Senate. On behalf of Senate, consider and approve all new graduate scholarships and awards. Any matter of controversy that might arise may be referred to Senate.

5. Undergraduate Council

5.01	There shall be a council of the university, appointed by and responsible to Senate, called the Undergraduate Council.
5.02	**Undergraduate Council Membership** The membership of this council shall consist of the following: *Ex Officio* The president of the university. The vice-president, academic & provost. The associate vice-president, academic, who shall co-chair this council. The dean of the federated university. The associate dean for undergraduate studies for each faculty. The registrar of the university. The university librarian, or delegate. The vice-president (education) or equivalent from the Undergraduate Student Association of each faculty of the university. Elected / Appointed One member of the faculty from each faculty of the university which offers undergraduate programs, each of whom shall serve for a term of two years. One member of faculty from the federated university, who shall serve for a term of two years. One member of faculty from the affiliated university colleges, who shall serve for a term of two years. A director appointed from Co-operative Education & Career Action. An executive member appointed from the Federation of Students.
5.03	**Powers and Duties of the Undergraduate Council** The Undergraduate Council shall consider all questions relating to the academic quality of undergraduate studies within the university and, without intending to restrict the generality of the foregoing, the Undergraduate Council shall,

	Make recommendations to Senate with respect to rules and regulations for the government, direction and management of undergraduate studies in the university. Make recommendations to Senate with respect to new undergraduate programs/plans, the deletion of undergraduate programs/plans, and major changes to undergraduate programs/plans. On behalf of Senate, consider and approve all new undergraduate courses, the deletion of undergraduate courses, and proposed changes to existing undergraduate courses and minor changes to programs and/or plans, and provide Senate with a summary of council's deliberations in this regard. Any matter of controversy that might arise may be referred to Senate. Advise the vice-president, academic & provost on all matters relating to undergraduate studies. Consider, study and review briefs on any aspect of undergraduate studies from members of the university.

Amended/consolidated from Bylaws 2, 3, 4, 8 and 9 in two readings, September and October 2014.

Attachment #4

Senate Bylaw 3

A bylaw relating to the selection of members of Senate of the University of Waterloo.

BE IT ENACTED as a bylaw of the University of Waterloo, as follows:

1. Chief Returning Officer

1.01 The university secretary ~~& general counsel (USGC)~~ or designate shall act as chief returning officer for the purpose of conducting the election of members of Senate. As chief returning officer, the ~~USGC~~ university secretary or designate has overall responsibility for the general conduct of such elections and by-elections, which shall be by secret ballot. Without restricting the generality of the foregoing, the chief returning officer shall:

Establish the timing of Senate elections and by-elections, subject to the provisions described in sections 2.01 and 2.03 below.
Call for nominations and when doing so inform the university community of the names of those members of Senate whose terms of office expire on 30 April of that year and whether such members are eligible for a further term of service.
Verify the eligibility of nominees and nominators.
For undergraduate student elections, provide nomination information to the Federation of Students Election Committee.
Distribute ballots and balloting information to eligible voters, allowing at least one week for the polling period.
Announce the results to the university community, and resolve ties, as necessary.

2. Elections

2.01 **Elections**

The election of faculty and student members to Senate shall be completed by the regular March meeting of Senate each year. Undergraduate student elections shall be held in conjunction with the annual elections conducted by the Federation of Students in February. Faculty and graduate student elections are conducted by the Secretariat ~~& Office of General Counsel~~.
The nomination period for faculty constituencies and graduate students is at least twenty-one (21) days. For undergraduate student constituencies, the nomination period is determined in consultation with the Federation of Students. The chief returning officer shall call for nominations from those faculty and student constituencies that have members whose terms are expiring by placing a suitable notice in such places and ways as may be designated from time to time by Senate, with copies to the appropriate faculties and constituency presidents. Nomination forms shall be made available by the Secretariat ~~& Office of General Counsel~~. Nominations shall be submitted in writing to the chief returning officer. Each nomination shall be signed by the required number of members of the constituency from which the member is to be elected and shall include a signed statement from the nominee agreeing to serve if elected. For faculty and graduate students, the required number of members is five; for undergraduate students elected from a single faculty, the required number is twenty-five; for undergraduate students elected at large, the required number is one hundred.

Undergraduate student nominees, or their representatives, shall attend an all candidates' mandatory meeting held by the Federation of Students. The chief returning officer, or designate, shall also be present.
For faculty and graduate student elections, the chief returning officer shall publish the candidates' statements in such places and ways as may be designated from time to time by Senate.

2.02 **Campaigning/Voter Eligibility**

Public campaigning shall not take place before the close of nominations. For faculty and graduate student elections, nominees are to provide a brief statement (100 words maximum) to appear with the ballot.
The Federation of Students election rules regulating campaigning for undergraduate student elections, except for spending limits, shall be followed. The Federation of Students Election Committee decisions may be appealed to the ~~USGC~~university secretary, who shall act as chief returning officer, and whose decision is final.
The campaign spending limit for undergraduate students shall be: up to $100 for constituency seats and $200 for at-large seats, with all campaign costs to be borne by the candidate.
In a faculty constituency, all faculty members who hold a regular faculty appointment in that constituency are eligible to vote. In a graduate student constituency, all full-time and part-time graduate students registered in a degree program in that constituency are eligible to vote. In an undergraduate student constituency, all full-time students registered in a degree program in that constituency are eligible to vote; this includes students whose academic programs require a prolonged absence from campus such as a co-op work term or an approved study term abroad.

2.03 **By-Elections**

The ~~USGC~~ university secretary shall declare a Senate seat vacant:
upon receipt of a written resignation from a member of Senate.
when a member of Senate ceases to be eligible to represent the constituency that elected the member, for example when a faculty member ceases to hold a regular faculty appointment, or when a student graduates or otherwise ceases to be registered in the constituency that elected the student.[1]
If, within any year, a member of the Senate or any of its committees or councils, not having been granted permission to be absent by such body, attends less than 50 per cent of the regular meetings of such body, the member's office shall be by that very fact considered to be vacated and a confirmatory resolution shall be passed by Senate declaring the membership vacant. The Senate or its committee or council may grant such permission to members who are going on an approved sabbatical, on a co-op term, or any similar such absence related to the members' employment and/or educational program.
Subject to the provisions noted below, the chief returning officer shall call by-elections to fill vacancies as soon as feasible and shall place a suitable notice in such places and ways as may be designated from time to time by Senate, with copies to the appropriate faculties and constituency presidents. Nominations shall remain open for at least one week and shall be submitted in writing to the chief returning officer. Each nomination shall be signed by the required number of members of the constituency from which the member is to be elected~~,~~ and shall include a signed statement from the nominee agreeing to serve if elected. For faculty and graduate students, the required number of members is five; for undergraduate students elected from a single faculty, the required number is twenty-five; for undergraduate students elected at large, the required number is one hundred.
When a seat is vacant because of the failure of a constituency to nominate any candidate to contest an election or by-election, that seat shall remain vacant until the next annual election, unless a petition [available from the Secretariat ~~& Office of General Counsel~~] requesting a by-election

	signed by the required number of members of the constituency concerned is received by the chief returning officer. When a seat becomes vacant within three months of the end of the term for that seat, no by-election shall be called to fill the vacancy for the balance of the term. No by-election shall be called or held in any constituency between 1 July and 15 September. In addition, no by-election shall be held in any undergraduate constituency between 1 April and 1 July.

3. Alumni representation

3.01	Each year the Alumni Council shall recommend the names of individual(s) for appointment to Senate. The ~~USGC~~ university secretary shall be informed of such recommendations as they are made and shall so inform Senate.

4. Board of Governors Representation

4.01	Each year the ~~USGC~~ university secretary shall request the Board of Governors to elect from among its community-at-large members as many as four individuals to serve as members of Senate pursuant to paragraph 18(b)(1) of *The University of Waterloo Act, 1972*. The ~~USGC~~ university secretary shall be informed of the results of such election promptly following its completion, and shall so inform Senate.

Approved by Senate 15 June 1972.
Amended by Senate January 1973.
Amended by Senate April 1973.
Amended by Senate June 1975.
Amended by Senate in two readings, September and October 1975.
Amended by Senate in two readings, November and December 1982.
Amended by Senate in two readings, January and February 1983.
Amended by Senate in two readings, December 1984 and January 1985.
Amended by Senate in two readings, December 1989 and January 1990.
Amended by Senate in two readings, October and November 1990.
Amended by Senate in two readings, November and December 1991.
Amended by Senate September 1995.
Amended by Senate September 1999.
Amended by Senate in two readings, October and November 2013.
Amended from Bylaw 5 by Senate in two readings, September and October 2014.
Amended by Senate in two readings, January and February 2016.

[1]See *The University of Waterloo Act*, section 25, for instances when graduating students may be exempt.

University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
Report to Senate
20 November 2017

Senate Graduate & Research Council met on 16 October 2017, and considered one proposal to establish a new program field. Council agreed to forward the following item to Senate for approval. Council recommends this item be included in the regular agenda.

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

FOR APPROVAL

CHANGES TO ACADEMIC PLANS

Faculty of Environment

1. **Motion:** To approve a new PhD program in Sustainability Management, effective 1 September 2018, as presented in Attachment #1.

   Rationale: The Faculty of Environment is proposing a new doctoral program in Sustainability Management. This new research-based degree program will be the flagship degree program of the School of Environment, Enterprise and Development (SEED) unit within the Faculty of Environment. The objective of the program is to enable students to create theoretically sound and rigorous research applications to management problems in environment, enterprise and sustainable development.

   This doctoral program was conceived in response to the need for a PhD degree within SEED by its faculty members and an increasing number of potential doctoral students who work with SEED faculty supervisors but are obligated to enroll in PhD programs housed in other departments, both within and outside the faculty of environment. Current PhD students under SEED faculty supervision have voiced concerns on the absence of a specialized PhD degree in SEED's core subject area, sustainability management, and the consequent absence of specialized course work and comprehensive examination in this field.

   The proposed Sustainability Management PhD program will contribute to advancing scholarly knowledge and training on sustainability management in an integrated manner. It will prepare PhD students for a host of career paths making them fully trained for careers within and outside the academia, including research, policy and practice oriented careers with government and non-government organizations.

/kw

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

Charmaine Dean
Vice President, University Research

UNIVERSITY OF WATERLOO

GRADUATE PROGRAM PROPOSAL
OF
DOCTOR OF PHILOSOPHY
IN
SUSTAINABILITY MANAGEMENT

Submitted to the

Ontario Universities Council on Quality Assurance

VOLUME I - PROPOSED BRIEF

REVISED JULY 2017

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1 INTRODUCTION

The doctoral program was conceived in response to the need for a PhD degree within SEED by its faculty members and an increasing number of potential doctoral students who work with SEED faculty supervisors but are obligated to enroll in PhD programs housed in other departments, both within and outside the faculty of environment. Current PhD students under SEED faculty supervision have voiced their concerns on the absence of a specialized PhD degree in SEED's core subject area, sustainability management, and the consequent absence of specialized course work and comprehensive examination in this field.

The PhD in sustainability management will be the flagship degree program of SEED and it will contribute to advancing scholarly knowledge and training on sustainability management in an integrated manner. It will prepare PhD students for a host of career paths making them fully trained for careers within and outside the academia, including research, policy and practice oriented careers with government and non-government organizations. Given its interdisciplinary nature, the program will appeal to Canadian and international students from a broad range of master's programs in management, the social sciences, applied sciences, engineering and others, which address the role of for-profit, government and third sector organizations in realizing and managing sustainability goals through innovative approaches in both developed and developing economies.

The program is oriented towards those students who want to pursue a PhD on a full time basis and who are interested in applied research based careers in academia, public policy, and business. It will build on the unique strengths of SEED, which has built a strong interdisciplinary teaching and research program drawing on management, sustainability science, industrial ecology, international development, economic development, ecological economics, and policy. While SEED currently offers master's degrees that address both professional and research based training in these areas, SEED recognizes the need to educate, mentor and train highly qualified persons in the research and analysis that underlie these areas. This PhD degree will add to the existing graduate program offerings in SEED. In particular, it will complement the existing research based master's program in Sustainability Management (MES). The proposed program will enhance research skills, and develop scholarly knowledge, methods and tools through course work and research in sustainability management.

The program will charge regular tuition fees.

More detailed information on SEED and ENV are available at the following:

- http://www.environment.uwaterloo.ca/seed/
- http://uwaterloo.ca/environment/

The PhD program will have close relationships with the following other centres, institutes and departments at the University of Waterloo:

- Department of Geography & Environmental Management (http://www.environment.uwaterloo.ca/geography)
- School of Environment, Resource and Sustainability (https://uwaterloo.ca/environment-resources-and-sustainability/)
- School of Planning (http://www.environment.uwaterloo.ca/planning/)
- Centre for Business, Entrepreneurship & Technology (http://www.conrad.uwaterloo.ca)
- Department of Political Science (http://politicalscience.uwaterloo.ca)
- Department of Management Sciences (http://www.mansci.uwaterloo.ca)
- Department of Economics (http://economics.uwaterloo.ca)
- School of Accounting & Finance (http://accounting.uwaterloo.ca)
- Waterloo Institute for Sustainable Energy (http://wise.waterloo.ca)
- Balsillie School of International Affairs
- The Water Institute – University of Waterloo

Members of these institutions collaborate with SEED in research and teaching and SEED faculty are members of many of these institutions. Thus, SEED PhD students will have access to experts outside of the school as well that could act as co-supervisors, advisory committee members, readers or in other functions.

1.1 Brief Listing of the Program

The following is a brief executive summary that describes the proposed program in general terms.

The objective of the program is to enable students to create theoretically sound and rigorous research applications to management problems in environment, enterprise and sustainable development.

Research-based: This proposed PhD program in Sustainability Management is a research-based degree program that will require students to complete 1.0 units of mandatory courses (0.5 units is equivalent to a one term course), 1.0 units as elective courses, and PhD Professional Development Seminars that focus on practical skills in consulting, evaluation, and analysis. The supervisor may ask the student to complete additional electives if they are needed for the student's research. While the courses, the comprehensive

examination and the dissertation focus on knowledge creation, the core of the PhD Professional Development Seminars is knowledge mobilization. These seminars also provide students with the opportunity to apply the knowledge on sustainability management concepts, theories, and methods that they have acquired in their program to real world sustainability management problems. These seminars will prepare students for a career outside of academia.

Furthermore, the students have to successfully complete a comprehensive examination that tests the student's academic knowledge in theories and concepts of sustainability, such as environmental, social, and economic sustainability and corporate sustainability and management (environmental management, innovation management, business management) and provides a background to their research. Students will be examined with regard to their knowledge on the body of literature on sustainability management. As a further milestone, students who have passed their comprehensive examination will present their PhD thesis proposal to their doctoral advisory committee.

In addition to course work, PhD Professional Development Seminars and the comprehensive examination, students write a doctoral dissertation embodying the results of their research on a topic approved by their doctoral advisory committee members. Usually, the advisory committee consists of the members of the comprehensive examination committee. The thesis can be presented either in the form of a monograph or a number of publishable research papers.

Both full-time and part-time enrolment will be permitted. The minimum period of full-time enrolment is 9 terms (three years) or its equivalent. Degree requirement are normally to be completed in 12 terms (four years) for full-time study or within 20 terms (seven years) for part-time study. Usually the full-time students complete their core course requirements within their first three terms, with the comprehensive examination at the end of the fourth term, followed by their PhD thesis proposal in the fifth term, and are then prepared to begin their thesis research in their fifth or sixth term.

Tuition: The regular graduate Faculty of Environment tuition schedule will apply to both full-time and part-time students.

Number of students: It is anticipated that there will be a full-time equivalent cohort of 10 new students per year, with two-thirds being full-time students and the remainder being part-time. First year enrolment will be approximately 6 to 8 students—this will allow issues that may surface during the implementation year to be effectively resolved. From the second year on we plan to have 9 to 12 students enrolling, with a steady state of 35 students in the program achieved in four years. These numbers are consistent with

the number of PhD students that eligible SEED faculty are currently supervising in other programs. A master's degree will be required for admission. It is anticipated that once adequate international scholarship funding is identified, a significant part of the full-time cohort (about 30%) will be international students as outlined in the Sixth Decade Plan of the University of Waterloo.

Summary of program structure: A student will be able to complete the entire program through successful completion of 2.0 units of courses (two core courses and two electives), two PhD Professional Development Seminars, a comprehensive exam, PhD thesis proposal, and a research dissertation.

In general, the program structure requires that each student:

- Complete two mandatory courses: SUSM 701, SUSM 702 (0.5 units each)
- Complete two electives (0.5 units each)
- Complete two PhD Professional Development Seminars
- Maintain a minimum grade average of 75%
- Complete a comprehensive exam
- Complete and successfully defend a PhD thesis proposal
- Complete and successfully defend a research dissertation

1.2 Method Used for Preparation of the Brief

The University of Waterloo is committed to significantly increasing research-based graduate studies at the University in the next decade. The new PhD in Sustainability Management will contribute to achieving this goal.

The School for Environment, Enterprise and Development (SEED) is an academic unit within the Faculty of Environment that was launched in fall 2009 and is the responsible unit for the development and implementation of the proposed PhD program. A PhD degree was first considered when the master's program in Sustainability Management was introduced in 2013 and is identified in the School's strategic plan. After gaining experience with Sustainability Management as a research based master's program, the SEED PhD program has been brought forward. The success of the undergraduate programs in Environment and Business and in International Development, as well as the success of the School's master's programs have proven that demand for education in area of sustainability management is already high and the need for skills, knowledge and training in this area is growing rapidly. Furthermore, SEED faculty members are highly experienced in graduate supervision both at the Masters and PhD levels; in addition to Master's

thesis supervision within existing SEED graduate programs, its faculty members have a significant engagement in supervising PhD students enrolled in a number of departments (e.g., SERS, Planning, GEM). In total SEED faculty has supervised 35 PhD students since 2010.

The development of a PhD program within SEED was contemplated by the Faculty's Strategic Plan and by the Dean's Doctoral Initiative, both striving to increase the number of PhD students in the faculty.

On September 8 2015, in a SEED faculty meeting the motion was carried that a committee pursues the development of a PhD program. The committee started to meet in December 2015 and has conducted 6 meetings to develop the proposal brief.

Two meetings were held in January to March 2016 with staff from the Centre for Teaching Excellence at the University of Waterloo in order to develop and review various aspects of this proposal and especially the courses, teaching requirements and objectives.

Analyses of comparable programs. To identify how a PhD program in Sustainability Management at the University of Waterloo may fit into the broader academic landscape of sustainability management, concentrated research was carried out in January and February 2016 that analyzed successful graduate programs in similar areas. The goal of this research was to understand common trends and existing models. It showed that similar programs exist, but that there is a need for programs focusing on the connection between sustainability and management. Programs such as "Ethics and Responsible Leadership in Business" (http://www.ethicsinbusiness.eu/html/ethics/en/881.htm) focus exclusively on sustainability in business. Other programs, such as the PhD program of the School for Environment, Resources, and Sustainability at the University of Waterloo focus on social-ecological resilience. Overall, there are 14 PhD programs focusing on sustainability in Canada. One is located at business schools, six are in science, three focus on agriculture, two are located in faculties of environment, and one focuses on architecture and social sciences respectively (http://www.canadian-universities.net). Furthermore, programs preparing PhD students for careers outside academia are rare. An overview about Canadian, US American, Asian, and European PhD programs focusing on sustainability is presented in the following Table 1.

Table 1: Sustainability PhD programs in Canada, USA, and Europe (Sources: www.canadianuniversities.net, www.phdstudies.com, www.aashe.org)

Program Name	University	Country
Astronomy and Environment and Sustainability	Western	Canada
Environment and Sustainability	Western	Canada
Geophysics and Environment and Sustainability	Western	Canada

Physics and Environment and Sustainability	Western	Canada
Environment and Sustainability	University of Saskatchewan	Canada
Environmental Management and Sustainable Development	University of Calgary	Canada

Program Name	University	Country
Globalization, Development, Economies and Sustainability	Queen's	Canada
Social and Ecological Sustainability	University of Waterloo	Canada
Sustainability	University of British Columbia	Canada
Sustainable Landscape Systems	University of Guelph	Canada
Sustainable Rural Communities	University of Guelph	Canada
Sustainable Planning and Design	University of Manitoba	Canada
Sustainable Systems	University of Saskatchewan	Canada
Planning with a Specialization in Environment and Sustainability Planning	University of Toronto	Canada
Sustainable Development	Columbia University	US
Environmental Science	Colorado Technical University	US
Forestry & Environmental Studies	Yale	US
Ecology, toxicology, environmental policy	Duke	US
Civil, Environmental and Sustainable Engineering	Arizona State University	US
Construction Management & Sustainability	University of Pittsburgh	US
Environmental Studies with a Focus on Agroecology and Sustainable Agriculture	University of California	US
Local Government Management for Sustainable Communities	Walden University	US
Natural Resources and Sustainability	University of Alaska	US
Resource Management & Sustainable Development	West Virginia University	US
Sustainability	Arizona State University, Rochester institute of Technology	US
Sustainability Education	Prescott College	US
Sustainability Science	Saint Louis University	US
Sustainable Agriculture	Iowa State University	US
Environmental Studies,	Charles University	Prague, Czech Republic
Ecology	Charles University	Prague, Czech Republic
Environmental Science	Charles University	Prague, Czech Republic
Forestry and Forest Ecology	University of Goettingen	Germany
Development Studies	Lisbon School of Economics & Management	Portugal
Politics, Human Rights and Sustainability	Scuola Superiore	Sant'Anna, Italy
Management-Innovation, Sustainability and Healthcare	Scuola Superiore	Sant'Anna, Italy
Environmental and Geomorphological Sciences	University of Nottingham	UK
Environment and Society	University of Nottingham	UK

Sustainable Built Environment	University of Minho	Portugal
International Doctoral Program in Engineering for Sustainability	University of Kyoto	Japan

We believe that the PhD program in Sustainability Management is distinct – and needs to be distinct – from programs in business schools and those focusing on general – mostly environmental – sustainability. Given the ecological and social imperatives and academic as well as practice demands for research on sustainability management our program will offer research-practice intensive and distinctly holistic, inter-disciplinary, critical, creative and problem-solving approaches to sustainability education that also serves to bridge the science-policy gap, and caters to the needs of organizations within and outside of academia.

Much of the present programs focus on strictly disciplinary approaches and are exclusively academically oriented. But there is an increasing recognition that programs are needed to train to develop and to apply, analytical tools and processes, as well as models based on theoretical foundations. This demand is currently being met in an unsystematic manner across a variety of disciplines, but there are very few PhD opportunities to meet the growing demand for rigorous, research based training and the creation and development of new knowledge in the sustainable management field that offers access to careers inside and outside of academia.

As the Conference Board of Canada's study on PhD programs suggests there is a need for skill development in PhD programs that prepare students also for careers outside of academia because only a portion of Ph.D. students will pursue academic careers.[1] An analysis that has been conducted to get feedback from organizations outside of academia that hire PhD's suggests that students should have the following skills to be hirable outside academia:

- Ability to develop epistemological and methodological agility so that students can collaborate effectively across disciplines and across sectors.
- Develop expert facilitation and knowledge management skills, including process design, so that students could support complex problem solving processes involving non-academic as well as academic experts
- Develop skill in leading evaluation, monitoring and assessment processes.

[1] The Conference Board of Canada. (2015). Inside and outside the academy. Ottawa, ON.

Therefore, the proposed program will offer seminars that help students to develop professional skills that support a transition to careers outside of academia and teach students how to mobilize their knowledge. However, in order to train students for an academic career[2] as well, the seminars will be offered in addition to the academic coursework.

Further Evidence of Demand. As indicated above, the faculty decided to offer master's opportunities in environment and business, development practice, economic development and sustainability management before committing to PhD education. Within SEED, the existing masters' programs admitted approximately 350 students between 2011 and 2015. With enrolments between 13 and 29 students per program and year. Several of the alumni of these programs are currently enrolled in a PhD program or have successfully finished a PhD. A good fraction of those are pursuing an academic career but most are work outside of universities. Half of the masters students currently enrolled in SEED are interested in a PhD program. Moreover, SEED faculty members are increasingly being successful in the Tri-Council and other major funding applications, most of which have a requirement to train PhD HQPs as part of their project deliverables.

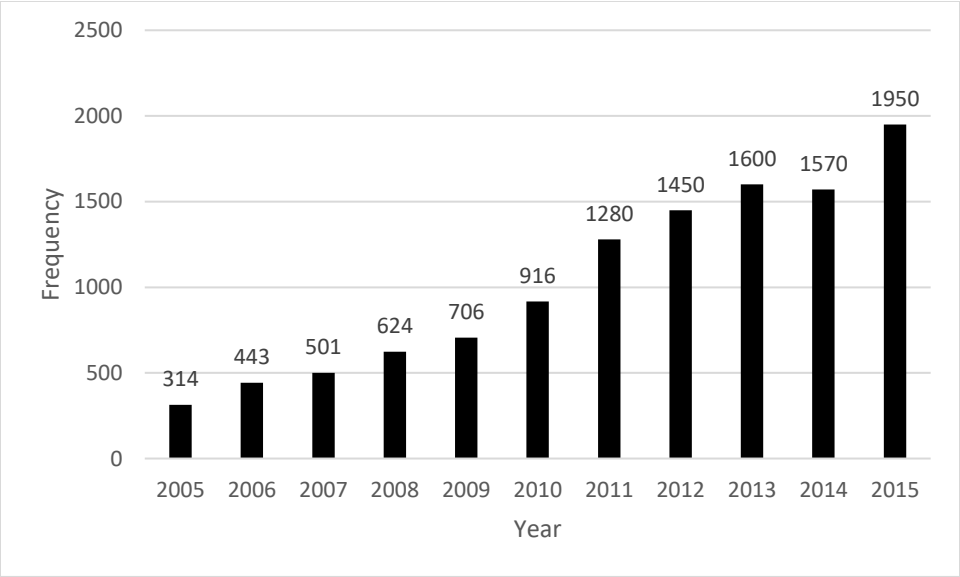

Figure 1: Frequency of hits for the term "sustainability management" in Google Scholar (articles excluding patents)

[2] Chiose, S. (January24, 2016). More PhDs finding jobs as tenure-track professors, study says. Globe and Mail: Toronto, ON.

An analysis on Google scholar suggests that the term sustainability management is increasingly analyzed in research. Between 20015 and 20015 the hits for the term on Google Scholar increased from 314 to 1950 per year indicating an increase of more than 500%. Figure 1 illustrates this increase in research publications on sustainability management.

1.3 Objectives of the Program

The objective of the program is to meet a growing need for research to contribute to academic knowledge and train highly qualified persons in the field of sustainability management to create theoretically sound and rigorous research applications to management problems in environment, enterprise and sustainable development.

Education and research is needed to contribute to the sustainable development objectives of society. The PhD program will enhance research skills, and develop academic knowledge, methods and tools through course work and academic research in sustainability management. Graduates will be prepared for both academic careers and careers outside of universities.

The proposed PhD program fits well within the parameters of the Faculty of Environment at the University of Waterloo mission to build a better, sustainable and just world including a commitment to academic training and research in the interrelated areas of environment, sustainability, enterprise and development. Toward this end, the Faculty has developed the Dean's doctoral initiative that strives to increase the number of PhD student in the Faculty of Environment. The program proposal is also in line with the University of Waterloo's Sixth Decade Strategic Plan that states that the University of Waterloo is committed to significantly increasing research-based graduate studies at the University in the next decade. As envisioned, the PhD program will not only serve as a significant contribution to the sustainability field but will also reinforce the goals of the University of Waterloo as an academic institution that believes in innovative, integrated, and experiential learning, cooperative education, and global engagement. Furthermore, the proposed program will be in-line with SEED's strategic plan that focuses its research on the intersection of development and business activities with sustainability concerns.

Program and learning objectives. The overarching objectives of the PhD program are to:

- Creating theoretically sound and rigorous research applications to management problems in environment and sustainable development.
- Develop academic literacy in science and social sciences, including a critical understanding and the ability to select and apply methods, and the ability to critically reflect on sustainability management literature;

- Understand and evaluate the development of theoretical knowledge in sustainability management, including critical engagement with theories in light of contemporary problems
- Interpret, assess, synthesize and apply academic knowledge to develop new models, tools, research hypotheses, and research.
- Use rigorous academic methods and to create research to solve sustainability management problems in academia and practice.
- Acquire professional skills in the production of their own ideas, including skills in scientific, policy paper, and report writing, oral communication, grant- and proposal writing, program evaluation, research and analysis, and consulting.

These program objectives acknowledge that there is a need to more creatively understand PhD training and research on sustainability management. Focusing on the roles and responsibilities of businesses, public administration, individuals and communities, the program will equip graduates with the theoretical knowledge and research and practice skills needed to step into roles as academic researchers as well as non-academic researchers, policy analysts, and consultants in the interdisciplinary field of sustainability.

To accomplish the program objectives, students who complete the program should be able to:

1. Achieve a systematic understanding of knowledge and critical awareness of current problems and new insights of sustainability management, much of which is at the forefront of the interdisciplinary academic work.
    - Know the basic scientific foundations of ecological and bio-physical systems, especially physical limits to growth, complexity and resilience
    - Know the theoretical underpinnings of sustainable development
    - Know issues connected with sustainable development like sustainable business, north-south relations, inter- and intra-generational equity, efficiency and resource maintenance as well as understanding different subjects in management like business management, environmental management, complex systems management, innovations management and command-and-control management.
    - Know about management approaches including management theories, such as institutional theory and stakeholder theory.
    - Know about the underlying theoretical and practical background and consequences of sustainability innovation.
2. Demonstrate a conceptual understanding and methodological competence that enables the use of research techniques, the critical evaluation of current and advanced research, and the research to solve complex research questions
    - Knowing the basics of the philosophy of science and epistemology, and being able to link this knowledge to different methodologies
    - Differentiating between multidisciplinarity, interdisciplinarity and transdisciplinarity, and the importance of their application to sustainability management as well as how to successfully draw on multiple topics of inquiry in advanced research inquiries
    - Applying theories to research questions
    - Understanding the affordances and limitations of qualitative and quantitative methods from disciplinary and interdisciplinary perspectives (relevant to their research question)

- Assessing the benefits and challenges of integrating different methods

3. Apply an existing body of knowledge into the critical analysis of new research questions
   - Connecting existing research with their own research questions
   - Interpreting and evaluating the validity, objectivity and reliability of different sources like academic papers, websites, etc.
   - Integrating academic literature, methods, tools, etc. into their own research
   - Developing conceptual frameworks
4. Demonstrate professional capacity and autonomy such as showing ethical behaviour consistent with academic integrity and the use of appropriate guidelines and procedures for responsible research processes and appreciating the broader implications of applying knowledge to particular contexts in the field of sustainability management.
   - Understanding, implementing and appreciating research ethics
   - Broadening the understanding of theoretical underpinnings of environmental ethics, philosophical and cultural aspects
   - Applying ethics in research and decisions making
   - Incorporating professionalism and responsibility
5. Communicate ideas, results and conclusions clearly in an oral and written form
   - Understanding different descriptive and argumentative modes and norms of communication, both academic and non-academic
   - Being able to represent knowledge in a variety of contexts, including policy contexts, and appreciate visual, written and oral communication
6. Develop skills in disciplinary and interdisciplinary research necessary to contribute relevant scholarship to the sustainability management field
   - Understanding and evaluating qualitative and quantitative data
   - Being able to apply quantitative and/or qualitative tools to analyze data
7. In the context of a student's research, valuing the complexity and variety of knowledge and of the potential contribution of other interpretations, methods and disciplines
   - Assessing the validity, reliability and objectivity of research results
   - Understanding complexity and limits of knowledge
   - Evaluating the societal and ethical implications of research and knowledge
   - Understanding political impacts on research and political impacts of research
   - Interpreting research results on an interdisciplinary background

Graduate Degree Level Expectations. The proposed PhD program has been carefully reviewed to ensure that its course expectations lead to the accomplishment of the Graduate Degree Level Expectations (GDLEs) that have been established by the University of Waterloo. As the Table 2 below illustrates, the GDLEs are addressed multiple times by the proposed learning objectives.

Table 2: GDLEs and program outcomes (following page)

	1. Depth and Breadth of Knowledge	2. Research and Scholarship			3. Level of Application of Knowledge		4. Professional Capacity/Autonomy				5. Level of Communications Skills	6. Awareness of Limits of Knowledge
					The capacity to:							
Program Outcomes	A thorough understanding of a substantial body of knowledge that is at the forefront of their academic discipline or area of professional practice.	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 specialized fields, sometimes requiring new methods; and	c. The ability to produce original research, or other advanced scholarship, of a quality to satisfy peer review and to merit publication.	i) Undertake pure and/or applied research at an advanced level; and	ii) Contribute to the development of academic or professional skills, techniques, tools, practices, ideas, theories, approaches, and/or materials.	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	d. The ability to evaluate the broader implications of applying knowledge to particular contexts.	The ability to communicate complex and/or ambiguous ideas, issues and conclusions clearly and effectively.	An appreciation of the limitations of their own work and discipline, of the complexity of knowledge, and of the potential contributions of other interpretations, methods, and disciplines.
Achieve a systematic understanding of knowledge and critical awareness of current problems and new insights of sustainability management, entrepreneurship and innovation much of which is at the forefront of the interdisciplinary academic work.	X	X	X	X	X	X	X	X	X	X	X	X
Demonstrate a conceptual understanding and methodological competence that enables the use of research techniques, the critical evaluation of current and advanced research, and the research to solve complex research questions	X	X	X	X	X	X	X	X	X	X	X	X
Apply an existing body of knowledge into the critical analysis of new research questions		X			X		X			X		X
Demonstrate professional capacity and autonomy such as showing ethical behaviour consistent with academic integrity and the use of appropriate guidelines and procedures for responsible research processes and appreciating the broader implications of applying knowledge to particular contexts in the field of sustainability management.	X		X	X		X		X	X		X	
Communicate ideas, results and conclusions clearly in an oral and written form		X				X			X	X	X	X
Develop skills in disciplinary and interdisciplinary research necessary to contribute relevant scholarship to the sustainability management field						X	X	X	X	X	X	X
Acknowledge the complexity of knowledge and of the potential contribution of other interpretations, methods and disciplines	X	X	X	X	X							

2 ADMISSION REQUIREMENTS

Successful applicants must hold a master's degree with distinction (typically an overall average of at least 80%), or the equivalent. Furthermore, three letters of reference will be required for entrance into the program in addition to a description of the applicant's research interests and motivation. Facility with research methods is expected, whether through the presentation of specific graduate courses or original research at the graduate level. Full-time and part-time studies are available. Deferrals for admission and delayed entries will not be permitted

Applicants whose first language is not English must demonstrate command of the English language with a minimum TOEFL score of 100 (internet-based) or the equivalent on one of the following comparable tests: CAEL 70, IELTS 7.5, MELAB 90. (See Academic Regulations - English Language Proficiency Certification for examinations accepted at higher scores http://gradcalendar.uwaterloo.ca/page/GSO-ELP).

2.1 Structure

The PhD in Sustainability Management is granted to candidates who have adequately, demonstrated the PhD graduate degree level outcomes as well and the program's learning outcomes. Degree requirements of the program are:

- SUSM 701: Advanced theories (0.5 unit weight)
- SUSM 702: Research design and methods (0.5 unit weight)
- Two elective courses (1.0 unit weight)
- Two PhD Professional Development Seminars
- Satisfactory performance in a Comprehensive examination
- PhD thesis proposal
- Submission and defense of a thesis, embodying the results of original research

The elective courses may serve to fill a gap in the student's background for the proposed research, or to provide more detailed understanding of a crucial area, or more generally to broaden the student's base of advanced understanding. The mandatory elective courses must be taken at the graduate level.

Students may request permission from the SEED Graduate Advisor to enroll in elective courses in other graduate courses that will complement their program of study.

The comprehensive examination milestone requires the student to demonstrate their knowledge of the literature in sustainability management and be assessed on their breadth and depth of their knowledge as well as their ability to present their arguments in a coherent, logical and scientific manner. The comprehensive examination has to be conducted during the fourth academic term of the student's first enrolment in the

PhD program. The **comprehensive examination committee** will be set each year and consists of the school's graduate officer and at least two committee members from the school, depending on the candidates being examined. The comprehensive exam consists of a single written question based on a list of publications that will be set each year by the school. The written comprehensive exam will be on a set date each fall. The student's response must be submitted within a stipulated time frame (likely to be 8 to 24 hours) following receipt of the question and must be no longer than 5,000 words, not including the bibliography. Exams will be marked by (at least) two comprehensive examination committee readers and results will be compiled by the graduate officer. In case of disagreement by the committee, or where it would be fairer to the candidate (e.g., in some English-second language cases) the candidate would additionally be examined orally by the committee. The oral examination, if required, is chaired by a faculty member of SEED who is not a committee member. Accommodations to this process will be determined for students unable to write the exam on the set date or other circumstances, as appropriate.

In the PhD thesis proposal milestone the student presents the PhD thesis proposal to their **doctoral advisory committee** that has been set up, consisting of the supervisor, two committee members from the school, and one internal-external member who is not appointed or cross-appointed as SEED faculty. The PhD thesis proposal consists of a written and an oral part. The milestone will be completed shortly (within a term) after the comprehensive examination. The student sends the proposal in a written form to the committee members, gets their feedback and integrates the feedback into the proposal. The PhD thesis proposal is accepted if all committee members agree to accept it. The decision will be communicated to the school's graduate officer. The approved proposal is binding to both the student and the advisory committee.

The PhD Professional Development Seminars will allow students to prepare for jobs inside and outside of academia and focus on the application of theories, concepts and methods that students have acquired in their core courses. They are oriented to enable students to achieve skills in academic research, consulting and evaluations and to conduct knowledge mobilization. In these seminars students develop a project proposal, an evaluation plan, or the outline for a consulting project. The results will be marked by the course instructor, the students' supervisors, and an external 'client' of the course project.

The thesis should address original research and can be written either in form of a monograph or as a paper-based thesis. The thesis has to be presented in a public defense in front of a **doctoral defence committee** consisting of the members of the student's doctoral advisory examination committee and an external member who is not a faculty member of the University of Waterloo and who has not been involved in the candidate's research. After the presentation the committee asks questions about and provides comments to the thesis and the presentation.

The program will follow a traditional format in terms of its pedagogical delivery. However, in contrast to many other PhD programs it will add components that prepare students for jobs outside of academia as well.

In their first year, each student will establish their doctoral supervisory committee, begin their course work and research as well as prepare their PhD thesis proposal and do readings for the comprehensive exam. The thesis proposal provides the student with an opportunity to demonstrate their skills in developing a research program.

The comprehensive examination at the end of the first year allows the student to demonstrate their understanding of the literature in the field of sustainability management and be assessed on their breadth and depth of their knowledge, and their skills to present their arguments in a coherent, logical and scientific manner.

The PhD thesis proposal gives the student the opportunity to specify the research with regard to content, methods, and schedule. Furthermore, students will learn how to plan a research project during the discussion with their advisory committee members.

A part of the second year, the third and fourth years of the student's program are mainly devoted to researching, writing, and defending the thesis. However, during these years students will complete one of the PhD Professional Development Seminars in order to achieve practical consultancy, evaluation, or research skills and skills in knowledge mobilization.

All aspects of the Program work together to provide a rigorous scholarly foundation on which our students can build successful and distinguished careers. The time-line for the Program is in line with Senate guidelines (http://gradcalendar.uwaterloo.ca/page/GSO-Min-Require-PhD) and is long enough to ensure that learning outcomes are met but short enough to ensure that students complete in a timely manner.

Relationship of Learning Objectives to specific courses that will be offered. Care has been taken to ensure that the proposed Sustainability Management courses are logically organized so as to achieve the specific program learning objectives. The students will be exposed to the research and teaching of the core faculty of SEED and thus provided with and involved in the state of the art research in sustainability management. Table 3 illustrates that the learning objectives (knowledge and skills) will be addressed in multiple and reinforcing ways by the courses and the thesis.

Table 3: Knowledge and skills addressed in the core courses and milestones of Sustainability Management

	SUSM 701	SUSM 702	PhD Professional Development Seminar	Comprehensive Exam	PhD thesis proposal	Dissertation
Knowledge						
Basic concepts and sources of sustainable development	xx			xx	x	xx
Environmental and ecological economics	xx			x	x	x
Sustainable management and finance	xx			x	x	x
Sustainability policies	xx			x	x	x
Industrial ecology	xx			x	x	x
International and local development	xx			x	x	x
Sustainability science	xx			x	x	x
Research methods		xx			xx	xx
Skills						
Research, analysis		x	xx		x	x
Consulting		x	xx		x	x
Evaluation		x	xx		x	x

The Graduate Degree Level Expectations (GDLEs) will be addressed by the courses and milestones as presented in the following Table 4.

Table 4: Graduate Degree Level Expectations (GDLEs)

	Courses and Key Learning Experiences							
	Core Courses		Milestones		Seminars			Dissertation
	701	702	Comp. Exam	Research Proposal				
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.	xx	x	xx	xx				xx
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;	x	xx	x	xx	x	x	x	xx
b. The ability to make informed judgments on complex issues in specialized fields, sometimes requiring new methods	x	xx	x	xx	x	x	x	xx
c. The ability to produce original research, or other advanced scholarship, of a quality to satisfy peer review and to merit publication.	x	x	xx	xx				xx
3. Level of Application of Knowledge								
The capcity to:								
i) Undertake pure and/or applied research at an advanced level; and	x	x	xx	xx				xx
ii) Contribute to the development of academic or professional skills, techniques, tools, practices, ideas, theories, approaches, and/or materials.	x	x	xx	x	xx	xx	xx	xx
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;			x	x	xx	xx	xx	xx
b. The intellectual independence to be academically and professionally engaged and current;			x	xx	xx	xx	xx	xx
c. The ethical behavior consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research; and		x	x	x	x	x	x	x
d. The ability to evaluate the broader implications of applying knowledge to particular contexts.			xx	x	x	x	x	xx
5. Level of Communications Skills								
The ability to communicate complex and/or ambiguous ideas, issues and conclusions clearly and effectively.			xx	xx	xx	xx	xx	xx
6. Awareness of Limits of Knowledge								
An appreciation of the limitations of their own work and discipline, of the complexity of knowledge, and of the potential contributions of other interpretations, methods, and disciplines.			xx	xx				xx

2.2 Effect of Structure on Quality

The Program requirements are designed to ensure the appropriate intellectual development of the student. The timeline to achieve these requirements is such that it allows students the necessary time to develop intellectually, to perform innovative research, and to be prepared to their future career inside and outside of academia. Based on the mapping of learning outcomes, both the GDLEs and the program-specific outcomes, all skills are taught and practiced or assessed prior to the handing-in of the written thesis and the oral defense. While the written thesis and the oral defense of the thesis map to a significant portion of learning

outcomes, other courses and milestones are strategically placed to ensure that the student is ready to handle the written thesis and defense (see Section 4 for timeline details).

Breadth and depth of knowledge is assessed considerably in the course work as well at the comprehensive exam, which is normally completed in the fourth terms of the Program. Presentation skills are practiced and/or assessed in the proposal defense, the dissertation defense, and in courses and seminars the students attend

3 PROGRAM CONTENT

The proposed PhD program is a unique and competitive degree designation that distinguishes itself from comparable programs. It builds on existing strengths of the master's programs in Sustainability Management (MES), Environment and Business (MEB), Local Economic Development (MAES), and Development Practice (MDP), and on SEED's undergraduate Environment and Business and International Development programs. Although all master's programs but Local Economic Development are relatively new they have increased their intake during the last years and collectively house nearly half of the master's students in the Faculty of Environment.

Given the sustainability imperatives and academic demand for research on sustainability management, our program will offer a holistic, critical, creative and problem-solving approach to sustainability research. Thus the courses were developed and chosen to prepare students for conducting interdisciplinary research and consulting in the field. Consequently, the following courses are offered:

SUSM 701: Advanced theories (0.5 units weight). The object of this course would be to understand theory in terms of epistemology and to review major theoretical paradigms in sustainability management, such as sustainable development, corporate sustainability, industrial ecology, and theories of justice. Students should show the capacity to identify, use and potentially build theories in relation to their research questions.

SUSM 702: Research design and methods (0.5 units weight). This course would take an overview of the research design process, linking theory and methodology to research questions (and considering ontological preferences of researcher). The relationship between inductive and deductive methods, between theory building and theory testing should be explored and students introduced in at least a superficial way to some of the major methodological approaches - qualitative approaches such as grounded theory, ethnomethodology, participant observation and quantitative methods such as survey research and statistical methodologies. The object of the course should be to understand the relationships between different methodologies and the basis on which to select methods. It should prepare students sufficiently so that they could make a choice between qualitative and quantitative approaches and elect to take a further course in one or the other.

Two elective courses: Each elective course has to be on a graduate level and can be a course being offered inside or outside the Faculty of Environment. The elective courses serve to fill a gap in the student's background for the proposed research, or provide more detailed understanding of a crucial area, or more generally to broaden the student's base of advanced understanding. **SUSM 775** will be created by the school as a special doctoral-level reading course, which allows a specific vehicle in the university calendar for students in the SUSM PhD program.

PhD Professional Development Seminars: Seminars focus on a consulting project, evaluation project, or a research project. They enable the students to achieve practical skills. The seminars use a problem-based approach of learning. Students will address a problem, create a proposal to solve the problem, and present a concept for knowledge mobilization. The proposal may be presented to the seminar instructors and to stakeholders that also will be involved in marking the proposal. Students have to attend two of the three seminars. These professional skills seminars are unique for PhD programs as they prepare students for their career inside and outside of academia.

3.1 Mode of Delivery

The PhD program is designed to facilitate a high quality academic experience for students. When students are admitted into the program, they will be assigned an academic supervisor to guide them through all stages of the program and especially through their research. We are committed to involving students in all aspects of academic life. In addition to benefiting from various speaker series', students will have opportunities to benefit from the presence of other visiting scholars. Strong partnerships are in place with organizations to enrich students' experience while in the program.

The PhD program will be offered in three primary modes of delivery that are suited to prepare graduates to deepen and broaden their academic knowledge, their ability to conduct interdisciplinary research, evaluations, and consultancy, and to contribute to greater research and scholarship in the field. The three modes are classroom-based courses, internet based courses and research.

Classroom-based courses. The core courses and some of the seminar options as well as a number of electives are classroom based. They will be delivered in a team-teaching mode to guarantee the inputs of the faculty members of SEED. All classroom-based courses will be offered in a way in which students will be expected to complete significant readings, participate in vigorous classroom discussions, and prepare and interact with classmates as well as the course instructors about substantial written assignments. It is expected that most of these courses will emphasize significant research assignments that will test a student's knowledge of a particular topic and challenge them to effectively research and present appropriate findings. Instructors may

also offer quizzes, exams or digital assignments to give students experience in persuasively communicating via multiple media.

Internet-based courses. Many of the electives will be delivered online. Some of the courses were developed for the existing MEB graduate program with the support of the Center for Extended Learning at the University of Waterloo. The first MEB course was offered in fall 2010. By winter 2015 all course in the program have been delivered at least twice. The PhD students can take these and other online courses offered by different programs inside and outside the Faculty of Environment.

Comprehensive examination. Candidates must write and pass a comprehensive examination within 16 months of beginning the program (the fourth term). Normally the exam will be held towards the end of the candidate's fourth term (December of year two). The exam will test their breadth and depth of comprehension of the leading literature in sustainability and in management. The comprehensive examination committee consists of the graduate officer and at least two committee members who are SEED faculty.

Dissertation. Students will have to complete and to defend a research dissertation embodying the result of their research on a topic approved by the department. The dissertation can be written in the form of a monograph or as a paper-based dissertation that contains publishable research articles, an introduction and a general conclusion. The dissertation should demonstrate the student's ability to conduct research under the guidance of a faculty committee. When the dissertation is ready for defense, including completion of revisions recommended by the committee, an oral defense will be scheduled. The candidate will present the dissertation in front of a committee and will respond to the committee's questions and comments about the dissertation and the student's research.

3.2 Assessment of Teaching and Learning

Courses offered through this program will be assessed by a variety of methods that best fit the course objectives. Student work will be evaluated by a combination of written work (papers, reflections, case studies, policy briefs, book reports, conceptual mapping) and oral presentations. Furthermore the comprehensive examination, PhD thesis proposal and the dissertation will be evaluated using academic standards.

Instructional quality will be measured by course evaluations regularly administered each term for each course.

In general the achievement of the learning outcomes will be assessed by

- assignments that are mandatory in the core and elective courses
- supervision and guidance of students by their supervisors
- completing a comprehensive examination
- writing and defending a proposal and research dissertation

3.3 Fields in a Graduate Program [optional]

The PhD program does not offer any fields.

4 HUMAN RESOURCES

Table 5 lists the faculty members to be involved in the PhD program, identifies their unit affiliation, and indicates gender. We are not distinguishing fields in the program, but faculty CVs provide substantive detail about their research background and qualifications. Currently SEED has 18 full-time faculty, two Full Professors, nine Associate, and eight Assistant Professors. Current faculty members have degrees in management, economics, law, science, ecology, political science, environmental science, engineering and psychology. SEED has 11 faculty members that are approved dissertation supervisors by Graduate Studies and Postdoctoral Affairs (GSPA). Overall SEED faculty has been involved in the supervision of 35 PhD students in other departments of the Faculty and outside the faculty. There are seven individuals who are fully appointed in the Faculty of Environment, whose courses have been selected as important electives and who will be expected to contribute to teaching in the foundation or core PhD courses or in student supervision.

4.1 Resources for Graduate Programs Only

Expertise. SEED and the University of Waterloo graduate departments and programs, which will deliver the proposed PhD program bring the education, experience, and connections to very well resource the program. The faculty mix includes skilled researchers from Environment and Business, International Development, Social Innovation Generation, Local Economic Development, Sustainability Management, and Geography. The degrees of the teaching faculty are very consistent with the goals of the program to provide education and research in sustainability management.

Table 5: SEED faculty and their main field of research.

Research field	Faculty
Sustainable business and organizations	Clarke Feltmate Lin Lynes Weber Wood
Sustainability assessment	Dias Habib Singh Young
Resources and sustainable community management	Frayne Hall Parker Swatuk Vinodrai
Environmental governance and public policy	Craik Thistlethwaite
Social innovation	Geobey Westley

Supervisory load distribution. It is expected that SEED faculty supervise on average 8 to 10 students per year. Once the program is running at capacity it is anticipated that a total of 35 to 50 students would be enrolled.

In summary, faculty involved in teaching in the PhD program and supervising PhD students and cross-listed courses possess a wealth of experience and diverse connections that will enrich the educational experience for students. The Faculty Names and Rank table lists those who will teach the courses in the program.

4.2 List of Faculty by Field

There are 18 full-time core professors.

Table 6 lists the faculty members involved in the graduate program, identifies their field affiliation, and indicates gender.

Table 6 : Faculty members involved in the graduate program

4.3 Faculty Members[3]			
Faculty Name & Rank	**Gender (M/F)**	**Home Unit [1]**	**Supervisory Privileges [2]**
Category 1			
Amelia Clarke, Associate	F	SEED	PhD
Neil Craik, Associate	M	SEED	PhD
Goretty Dias, Assistant	F	SEED	PhD
Bruce Frayne, Associate	M	SEED	PhD
Haiying Lin, Assistant	F	SEED	PhD
Jennifer Lynes, Associate	F	SEED	PhD
Prateep Nayak, Assistant	M	SEED	Master's
Simron Singh, Associate	M	SEED	PhD
Larry Swatuk, Associate	M	SEED	PhD
Jason Thistlethwaite, Assistant	M	SEED	Master's
Olaf Weber, Professor	M	SEED	PhD
Frances Westley, Professor	F	SEED	PhD
Michael Wood, Assistant	M	SEED	Master's
Steven B. Young, Associate	M	SEED	PhD
Sean Geobey, Assistant	M	SEED	Master's
Komal Habib, Assistant	F	SEED	Master's
Heather Hall, Assistant	F	SEED	Master's
Category 2			
	M	SEED	Master's
Category 3			
Paul Parker, Professor	M	GEM	PhD
Tara Vinodrai, Associate	F	GEM	PhD
Category 4			
Blair Feltmate, Associate	M	SEED	PhD

Category 1: tenured or tenure-track core faculty members whose graduate involvement is exclusively in the graduate program under review. For this purpose the master's and doctoral streams of a program are considered as a single program. Membership in the graduate program, not the home unit, is the defining issue.

Category 2: non-tenure-track core faculty members whose graduate involvement is exclusively in the graduate program under review.

Category 3: tenured or tenure-track core faculty members who are involved in teaching and/or supervision in other graduate program(s) in addition to being a core member of the graduate program under review.

Category 4: non-tenure track core faculty members who are involved in teaching and/or supervision in other graduate program(s) in addition to being a core member of the graduate program under review.

Category 5: other core faculty: this category may include emeritus professors with supervisory privileges and persons appointed from government laboratories or industry as adjunct professors. Please explain who would fall into this category at your institution.

Category 6: non-core faculty who participate in the teaching of graduate courses.

4.4 External Operating Research Funding

Table 7 presents the external research funding received by the core faculty by source and by year for the past seven years.

Table 7: External research funding

Operating Research Funding ($) by Source and Year [1]						
Fiscal Year [2]	**Tri-Agency Awards [3]**	**Public Sector and Non-Profit Funding [4]**	**Private Sector Funding [5]**	**Internal Awards [6]**	**Equipment Awards [7]**	**Total**
2009/10	$96,763	$12,500	$14,850	$13,227	$0	$137,340
2010/11	$51,010	$77,242	$11,600	$1,200	$0	$141,052
2011/12	$121,261	$715,688	$0	$21,487	$0	$858,436
2012/13	$368,137	$1,099,240	$45,000	$16,000	$0	$1,528,377
2013/14	$247,357	$175,254	$59,310	$8,000	$0	$489,921
2014/15	$300,449	$322,240	$56,450	$16,000	$0	$695,139
2015/16*	$167,606	$249,447	$20,500	$8,000	$0	$445,553
Totals	$1,352,583	$2,651,612	$207,710	$83,914	$0	$4,295,819

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 until April 30th, thus the 2012/13 fiscal year runs from May 1st 2012 until April 30th 2013, and includes three terms – Spring 2012, Fall 2012 and Winter 2013.
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.

4.5 Graduate Supervision

Table 8 presents completed, and current, supervisorships of master's and doctoral students, and post-doctoral fellows by faculty member. This provides information on experience of SEED faculty members in graduate supervision

Table 8: Completed, and current, supervisorships of master's and doctoral students

4.6 Completed and Current Numbers of Thesis Supervisions by Faculty Member						
Faculty Name and Rank[1]	**Career[2]**			**Current[3]**		
	Master's	**PhD**	**PDF**	**Master's**	**PhD**	**PDF**
Category 1						
Amelia Clarke, Associate	16	1	1	1	2	
Neil A. Craik, Associate	5			1	2	1
Goretty Dias, Assistant	8	1	1	3		1
Bruce Frayne, Associate				4	3	
Haiying Lin, Associate				6	3	
Jennifer Lynes, Associate				4	2	
Prateep Nayak, Assistant				4	1	
Simron Singh, Associate				6	2	
Larry Swatuk, Associate	16	2			3	
Jason Thistlethwaite, Assistant				2	1	
Olaf Weber, Professor	22	8		8	4	
Frances Westley, Professor	4	18	5		2	1
Michael Wood, Assistant	2			4		
Steven B. Young, Associate	5		1	6	1	
Sean Geobey, Assistant				3		
Komal Habib, Assistant				2		
Heather Hall, Assistant				2		
Category 3						
Paul Parker - Professor	60	7		8	5	
Tara Vinodrai - Associate	13			9	1	
Category 4						
Blair Feltmate - Associate	6			1	1	

Notes:

1. Faculty members are listed in the categories specified in Table 1.
2. Number of thesis supervisions for the total of a faculty member's career. Faculty members who are involved in more than one graduate program should list the number of students su-

pervised in the program under review and, in parentheses, the total number of students supervised in all graduate programs. If there are different types of degrees (e.g. MA, PhD) the number of supervisions in each degree should be noted.

3. Number of current thesis supervisions for each faculty member. Faculty members who are involved in more than one graduate program should list the number of students supervised in the program under review and, in parentheses, the total number of students supervised in all graduate programs. If there are different types of degrees (e.g. MA, PhD) the number of supervisions in each degree should be noted.

4.7 Quality of Faculty

The quality of the faculty who will teach the PhD or cross-listed courses can be measured by their accomplishments. The data on research and teaching presented in the CVs demonstrate that this teaching cohort is very well qualified to support the program. Collectively, they have the education, scholarship, experience with supervising students, and connection to the field of sustainability management, to accomplish program goals with an excellent quality and very effectively.

Academically, of the 20 faculty who are teaching the proposed program's or cross-listed courses, all have earned PhD's, representing seven different disciplines and have earned teaching awards for excellence. They have collectively authored 18 books, edited 19 more, contributed more than 150 chapters to other books, and read more than 370 papers at scholarly conferences in addition to their 106 papers in refereed conference proceedings. Furthermore they published nearly 260 papers in refereed journals.

To round out the theoretical aspect of their work with more practice oriented contributions, they have also authored more than 200 technical reports and more than 280 other research contributions. Examples of Journals in which SEED members have published are the Journal of Business Ethics, Risk Analysis, Economic Geography, Chicago Journal of International Law, Organization Studies, Ecology and Society, International Development Planning Review, Fish and Fisheries, Conservation and Society, Regional Environmental Change, Population and Development, and the International Journal of Lifecycle Assessment. The non-academic experience of the faculty members is presented in Table 9.

Table 9: Non-academic experience of SEED faculty members

Faculty member	Experience
Neil Craik	Lawyer
Olaf Weber	Consulting in banking, environment, and corporate sustainability
Simron Singh	International development
Amelia Clarke	Non-profit management
Steven B. Young	Management and sustainability consulting
Goretty Dias	Environmental consulting
Frances Westley	Management consulting, program evaluation
Blair Feltmate	Asset management, management consulting
Prateep Nayak	Development consulting

5 PHYSICAL AND FINANCIAL RESOURCES

5.1 Library Resources

The following is a summary of University of Waterloo Library information resources and services in support of the proposed PhD program in Sustainability Management, prepared by Agnes Zientarska-Kayko, Liaison Librarian for the School of Environment, Enterprise and Development (SEED).

5.2 Information Resources

Material is already collected to support learning, teaching and research to the Undergraduate and Masters level in the School of Environment, Enterprise and Development (SEED). The proposed PhD program in Sustainability Management (SUSM) is well supported with the existing collection emphasis on:

- Corporate Responsibility and Accountability
- Economic Growth and Ecological Sustainability
- Economics of Sustainable Development
- Energy and Sustainability
- Entrepreneurship and Small Businesses
- Environmental Management and Business Sustainability
- Equity in Developing and Developed Countries
- International Development
- Local Economic Development
- Sustainable Development

The decision to purchase Library materials for the proposed PhD program in Sustainability Management would be the responsibility of the SEED Liaison Librarian, in consultation with the Faculty Library Representative. Materials are obtained in a variety ways including firm orders, open orders, approval plans, and subscriptions.

In response to user preference, the Library obtains resources in electronic format whenever it is possible and practical to do so. Some electronic resources are obtained directly by the Library and some are obtained through membership in the Ontario Council of University Libraries (OCUL) and the Canadian Research Knowledge Network (CRKN). Access to and use of electronic resources is generally governed by licence agreements with the publisher or vendor.

The Library, along with the libraries of the University of Guelph (UG) and Wilfrid Laurier University (WLU), is a member of the Tri-University Group of Libraries (TUG) consortium. Collections from the University of Guelph and Wilfrid Laurier University enhance the depth and breadth of local materials available in subject areas of interest to Sustainability Management.

Library funds for the School of Environment, Enterprise and Development (SEED) support the cost of current journal subscriptions in the areas required to support the proposed Doctoral program. The Library collection also includes a considerable number of electronic journals that are part of large e-journal packages paid for through a central Electronic Resources library fund.

The Library, along with the libraries of the University of Guelph (UG) and Wilfrid Laurier University (WLU), is a member of the Tri-University Group of Libraries (TUG) consortium. Collections from the University of Guelph and Wilfrid Laurier University enhance the depth and breadth of local materials available in subject areas of interest to the Sustainability Management program.

The Library has purchased, or subscribes to, a range of electronic resources including research databases, full text journals, monographs, numeric data, and government publications. In addition, the Library identifies and provides access to select material freely available through the Internet. Such material includes open access journals, catalogues of libraries around the world, dictionaries, encyclopedias, and style guides.

The following are some of the electronic resources available that would be of particular interest to the Sustainability Management:

- *AccessUN*
- *ABI/Inform*
- *Business Source Complete*
- *CBCA (Canadian Business and Current Affairs)*
- *EconLit*
- *Environment Abstracts*
- *Environmental Sciences and Pollution Management*
- *Factiva*
- *LexisNexis Academic*

- *Mergent Online*
- MSCI ESG STATS
- *OECD iLibrary*
- *PAIS International (Public Affairs International Service)*
- *Rural Development Abstracts*
- *Scopus*
- *Web of Science*
- *World Development Indicators (World Bank)*
- *Worldwide Political Science Abstracts*

Most of the electronic resources are purchased from the Electronic Resources library fund.

Materials acquired for other departments are also of interest to the School of Environment, Enterprise and Development (SEED) and relevant to the SUSM PhD Program. Other departments include, but are not limited to, Geography & Environmental Management, Environment & Resource Studies, Economics, Political Science, Planning, and Accounting & Finance.

5.2.1 Statistics and Numeric Data

Also available to members of the uWaterloo academic community are the data holdings of <odesi>, OCUL's digital repository for social science data (http://odesi.ca). <odesi> provides web access to resources such as the Statistics Canada surveys and datasets, including the Canadian Census, through the Library's membership in the Data Liberation Initiative (DLI) and Canadian public opinion polls. Access is also available to the data holdings of the Inter-university Consortium for Political and Social Research (ICPSR) at the University of Michigan, in Ann Arbor, Michigan (http://www.icpsr.umich.edu/icpsrweb/ICPSR/).

Other statistical sources include OCED iLibrary, and World Development Indicators.

5.3 Services

5.3.1 Access to Electronic Resources

The primary tool for accessing electronic resources selected by the Library is its Web site (http://www.lib.uwaterloo.ca). This site organizes and provides access to licensed resources available to only University of Waterloo faculty, students and staff, as well as select Internet resources freely available to anyone. University of Waterloo faculty, students and staff may access electronic research databases and full text electronic journals from off-campus via the Library's Proxy Server / Connect from Home feature. The Library also provides access to bibliographic management software (RefWorks).

5.3.2 Access to Print Collections

The Library's print collections supporting the proposed Sustainability Management, PhD are housed primarily in the Dana Porter. Access to the entire Library collection, as well materials held by UG and WLU, is available through the Web accessible tool known as PRIMO (http://primo.lib.uwaterloo.ca).

Faculty, graduate students and staff may borrow most monographs for a term at a time. The Library also delivers to faculty, graduate students and staff copies of print journal articles from any of the University of Waterloo library locations, and from the libraries of the affiliated and federated colleges and universities. Faculty, graduate students and staff may also place holds on books from any of these libraries for pickup at any of the libraries' circulation desks. Books and journal articles not owned by the Library, but held by UG or WLU, may be requested by faculty, all students and staff through Primo. Items will be delivered to University of Waterloo within three working days. The cost of these services is absorbed by the Library.

In partnership with UG and WLU, the Library owns a facility, known as the Annex, which is used to house low-use research material. In keeping with the University's research intensive status, the TUG libraries ensure that a last copy is maintained in perpetuity, through the Preservation of Last Copy Agreement[3]. Items housed in the Annex will be delivered to uWaterloo within three working days. The cost is absorbed by the Library.

Books and copies of articles from print journals will be sent, upon request, to students living, temporarily, some distance from the campus. With the exception of return postage for books, the cost is absorbed by the Library.

5.3.3 Access to Resources from Institutions other than TUG

The Interlibrary Loan/Document Delivery (ILL) service provides faculty, students and staff with books, copies of journal articles, theses, and government documents from libraries within Canada and elsewhere. The Library uses OCUL's RACER Web based interlibrary loan system (https://racer2.scholarsportal.info/) to facilitate ILL access and service for users. With minor exceptions, the cost is absorbed by the Library.) to facilitate ILL access and service for users. With minor exceptions, the cost is absorbed by the Library.

[3] The Preservation of Last Copy Agreement is available online (http://www.lib.uwaterloo.ca/staff/irmc/last_copy_agreement_sept06.html).

Most Canadian university libraries extend, at no charge, in-person borrowing privileges to faculty, students and staff from across the country. Faculty, students and staff are entitled to borrowing privileges at participating libraries (http://www.curba.ca/).

5.4 Information Services

5.4.1 Research Skills, Critical Appraisal, Ethical Use

Drawing from the Ontario Council of Academic Vice-Presidents' Guidelines for University Graduate Degree Level Expectations and the Association of College and Research Libraries' Information Literacy Competency Standards for Higher Education, the Liaison Librarian for Sustainability Management would develop information literacy-related activities and materials, in consultation with faculty. These activities would include the development of online modules, research guides and screencasts as well as the seminars and outcomes-based workshops for students in the program. These sessions would support graduate students completing their literature reviews, comprehensives and graduate information research endeavours as part of their degree requirements and complement faculty mentoring in the same areas. Topics of interest to the Sustainability Management PhD program could include training in the following areas:

- academic integrity,
- information management associated with major research projects,
- searching for and evaluating grey literature, including government documents and statistics.

5.4.2 Research Consultation and Support

The Liaison Librarian for the School of Environment, Enterprise and Development (SEED) would be available for consultation with individuals or small groups of students. He or she may be contacted directly in person, by phone, and by e-mail if a personal visit to the Library is not convenient. New graduate students and faculty members are contacted by the Liaison Librarian and invited to meet for a consultation about how best the Library can support the research and underlying learning needs of the new member of the University of Waterloo research community with respect to the resources and services offered by the Library (which may differ from their previous institution).

The Librarian also develops and maintains an online subject guides for the following programs:

Local Economic Development (http://subjectguides.uwaterloo.ca/LED),

International Development (http://subjectguides.uwaterloo.ca/international-development), Environment and Business (http://subjectguides.uwaterloo.ca/ENBUS) and

Sustainability Management (MES) (http://subjectguides.uwaterloo.ca/SustainabilityManagement). The Librarian could develop an online subject guide for Sustainability Management.

Reference assistance is available in person or by telephone at the Library's Information Desks, which are staffed by professional librarians and specially trained library associates. Alternatively, faculty, students and staff may get reference assistance via e-mail and online chat available through the Ask a Librarian service (http://www.lib.uwaterloo.ca/asklib/index.html).

The Library also offers general orientation programs including tours, workshops on research skills, and seminars for students. In addition, each fall, the Library participates in a campus-wide orientation program for incoming students, including programs specific to international students and students with disabilities.

Faculty, students and staff may keep abreast of new services and developments in the Library by reading *news @ your library* (http://www.lib.uwaterloo.ca/newsatlib/), an electronic newsletter prepared periodically.

5.5 Conclusion

I believe that a high level support can be provided for the proposed PhD program in Sustainability Management.

I would be pleased to discuss the Library's holdings and services with the appraisers at the time of a campus visit. Agnes Zientarska-Kayko Liaison Librarian for the School of Environment, Enterprise and Development (SEED)

Reviewed by Annie Bélanger, Associate University Librarian, Information Resources and Academic Excellence for Mark Haslett, University Librarian.

5.6 Computer Facilities

All faculty and graduate students are provided with a UW Identity Access Management account (WatIAM) which provides access to electronic mail, internet/wireless, the student information system (Quest) and the online learning management tool (D2L).

All students in the proposed PhD program will be provided with access to computers and printers. The Faculty for Environment has its own computing service department called Mapping, Analysis & Design (MAD) that provides computing support to all faculty and staff in the Faculty of Environment. MAD also runs a computing Helpdesk where staff can answer questions relating to a variety of hardware,

operating systems, software and peripherals. The University has arranged for several software license discounts which are available to students.

5.7 Space

The total space is listed in the following Table 10:

Table 10: SEED space

Type	#	Approx. Space (square metres)
Administrative Staff	4	13
Faculty offices	17	13
Kitchen	1	20
Conference rooms	9	40
Classrooms	2	43

SEED is located in the ENV 3 building. This building is an accessible, living laboratory for students, faculty, public/private sector partners, and the community. The faculty strives for a LEED® Platinum certification of the building. Students from the Faculty of Environment submitted ideas for the design, use and management of outside areas, green roof and interior garden courts of the building. SEED has access to classroom, meeting rooms, and a kitchen, which are controlled by the Dean's office. An approximate total of 804 square meters is available for research and research support, faculty and graduate student offices. Faculty members have access to private offices with phone and computer. There is office space available for adjunct and cross-appointed faculty as well, i.e. to have their office hours in the same building as the core faculty.

It is expected that PhD students in the proposed program will have access to shared office facilities in the same manner as other graduate students in the Faculty of Environment. We will try and follow the guideline of the University of Waterloo that every PhD student is entitled to access to an office with a desk (four square metres of an office. In situations where insufficient space is available, it is preferable that every student engaged in research be given space, at the expense of meeting the four square metre goal.

5.8 Financial Support

The funding made available to Ph.D. students will be in line with the University and Faculty's current practice of providing a minimum guarantee of four years of funding (currently at $22,293 per year). Students entering SEED's doctoral program may expect funding from some combination of scholarships, teaching assistantships and research assistantships. To provide an example of how this funding

may be structure, master's students in the Sustainability Management Program currently get the following financial support:

Domestic students:

Year 1: $15,866

This amount is paid in the form of

1) two Teaching Assistantships, $4,933 each (one in Fall 2016 and one in Winter 2017),
2) two Graduate Experience Awards, $2,500 each (which supplement the TAs),
3) one Waterloo Graduate Scholarship in Spring 2017, in the amount of $1,000.

Year 2: Graduate Scholarship $1,000

International students:

Year 1: $13,313.00

This amount is in the form of

1. one Teaching Assistantship in Fall 2016 **or** Winter 2017 **or** Spring 2017, in the amount of $4,933
2. one Graduate Experience Award (which supplements the TA), in the amount of $2,500
3. three International Masters Student Awards ($1,960 per term for three terms) for a total of $5,880

Year 2: $5,880

This amount will be paid in the form of three International Masters Student Awards ($1,960.00 per term for three terms) for a total of $5,880

Scholarships – major awards for PhD students:

The most significant award presently available in Canada is the Trudeau Foundation Scholarship granted to only 15 doctoral candidates annually. It is currently valued at $35,000/year plus $15,000/year for travel and related expenses, tenable for up to three years.

Many of the domestic students applying to the proposed PhD program, and probably most if not all of those accepted, would also be applicants for a major CIHR, NSERC or SSHRC scholarship:

- the CIHR Canada Graduate Scholarships (CGS) Doctoral Awards are currently valued at $30,000/years for up to three years
- NSERC Canada Graduate Scholarships (CGS D) are currently valued at $35,000/year for up to three years
- NSERC Postgraduate Scholarships (PGS) are currently valued at $21,000/year for up the three years
- SSHRC CGS Doctoral Fellowships are currently valued at $20,000/years for up to four years.

Ontario-based candidates would also likely be applicants for an Ontario Graduate Scholarship (OGS), currently valued at $15,000/year for one year only, and may be eligible for an OGS in Science and Technology, with the same value.

At present, the University of Waterloo also provides all recipients of a major award (CIHR, NSERC, SSHRC, OGS) an additional President's Scholarship of $10,000 for each year of the major award.

International students are also potentially eligible for a variety of major awards, including Commonwealth Scholarships and awards from major private foundations (Ford Foundation, Aga Khan Foundation, etc.)

Scholarships offered by or through the University, the faculty, and the Department. In addition to the President's Scholarship, the University and the Department are able to offer scholarship support from a variety of funding sources.

The university gives each new full-time international student entering the doctoral program an International Doctoral Student Award (IDSA) currently valued at $2,900 per term for three years (unless the student is a recipient of a major external award).

Currently, the Dean's Doctoral Initiative funds 30 domestic PhD students per year. Faculty supervising PhD students in the proposed program will have access to this funding. Currently, SEED faculty 6 students that have been funded under the Dean's Doctoral Initiative. Under this initiative, more PhD students supervised by SEED faculty will be accepted in Fall 2016.

Each year the Department has access to UW Graduate Scholarship funds and certain other Donated Funds. It is difficult to predict the annual total available from these sources, but it should be sufficient to support awards of $2,000 to $5,000 to each incoming student who does not receive major scholarship support from another source.

In addition, students would be eligible for a variety of particular scholarships available at the University or to students in such a program.

Teaching assistantships and research assistantships. SEED already makes considerable use of its master's students as teaching assistants in support of its undergraduate programs. This would be extended to include the doctoral students. Teaching assistants in our Faculty are currently paid $6,800 per term, presuming 160 hours (10 hours/week over 16 weeks).

Similarly, SEED faculty members have long supported MES students as research assistants, with funding from major scholarly funding agencies (NSERC and SSHRC) and a wide variety of other sources (private foundations, government agencies, international bodies, etc.). Research assistants in the faculty are also paid slightly over $6,000 per term, presuming 160 hours (10 hours/week over 16 weeks).

We expect to have sufficient numbers of available assistantships to provide at least two assistantships annually for the first three years of study to support each incoming doctoral student who does not have a major award.

6 CURRICULUM

6.1 The Intellectual Development and the Educational Experience of the Student

The proposed program has been designed so that its different components are consistent, build on each other, and lead to a good experience for students.

Resources available from the University of Waterloo. Students will be encouraged to fully participate in workshops or events offered to the university community. The PhD program's student handbook that will be developed will note University of Waterloo resources that may be of particular interest to students for personal or career support, as well as how to connect to the larger community of PhD students at the university. Furthermore, student are encouraged to participate in Faculty of Environment seminars, research talks, and other events.

Programmatic resources. The proposed PhD program is fully managed at SEED and it will prepare and offer orientation to in-coming students such as a program handbook. Occasional receptions and events specifically for PhD students will be held from time-to-time. Students and faculty alike will be encouraged to get to know each other and relate to each other in a collegial and mentoring manner. Care will be taken to organize events and activities so that all students feel welcome to participate. Students working on a research project will have the opportunities to attend research conferences in their field and to present their research. The participation is usually a part of the project research funding.

The education experience in general. The educational experience for students has been developed to allow students to work on their research capacity and ability. In addition to the core courses and the electives, the students will be part of state-of the-art research programs and projects. Thus they will be able to gather the following knowledge, abilities, and skills:

- Developing scientific literacy, including a critical understanding and the ability to select and apply methods for sustainability management, and the ability to critically reflect sustainability management literature;

- Understanding of the development of theoretical knowledge in sustainability management, including and critically engage with theories in light of contemporary problems
- Interpreting, assessing, synthesizing and applying scientific knowledge to develop new models, tools, and research hypotheses that address sustainability management.
- Professional skills in the production of new ideas, including skills in scientific, policy paper, and report writing, oral communication, grant- and proposal writing, program evaluation, research and analysis, and consulting in applied areas of sustainability management.

These learning outcomes will qualify them for an academic and professional career in the field of sustainability management, such as program evaluation, consulting and research analyses for businesses, governmental and on-governmental organizations. A significant part of learning will come from conducting their own research and from preparing consulting, evaluation, and research plans during the seminars offered by the program.

Students will be on an email list that informs and invites them to all seminars and departmental workshops (e.g. research presentations, safety workshops, etc.) that will contribute to learning. Furthermore they will be informed about and encouraged to take advantage of workshops offered to the university community (workshops offered by the Centre for Career Action, the Centre for Excellence in Teaching, the Graduate Studies Office (e.g. on applying for fellowships, etc.)).

To integrate the students in to the department an orientation will be provided for new students at the unit level.

Provision of funding for travel to conferences, or encouragement to present research, e.g. in the Graduate Student Research Conference will be provided by the supervisors. Usually they either have travel funding available for students or help to apply for students` travel grants. This is supplemented by funds available from the Graduate Studies Office.

6.2 Program Regulations

The main program regulations are described in the sections on admissions requirements and course requirements

A further requirement is writing and defending a research dissertation on a significant topic in sustainability management. The dissertation should demonstrate the student's ability to conduct original research under the guidance of a research committee. A successful dissertation in the program demonstrates knowledge of existing research within the area of inquiry, the development of a sound research question that addresses current issues of academic research, the ability to apply appropriate methods, and the skill to write research and policy publications. The results of research should be original and contribute to the existing body of knowledge in the selected field. The dissertation should and includes

introduction (background, problem statement), literature review (status of research, methods, results, discussion – including contribution to theory - and conclusions. It can be written as a monograph or as a paper-based dissertation consisting of publishable academic articles, an introduction and a conclusion. The dissertation includes original research conducted by the candidate under the guidance of a committee that contributes to theory of research in sustainability management.

Candidates have to present their thesis before a committee. The Doctoral Dissertation Examination Committee consists of a minimum of five members: an external examiner, either the supervisor and three other members of the university, or the co-supervisors and two other members of the university. At least one of the non-supervising members must be from the home department, and at least one must be external to the home department (referred to as the internal-external). Normally, University of Waterloo members of the Examination Committee will be drawn from the student's Advisory Committee. The External Examiner is chosen by the Associate Dean for Graduate Studies who shall be provided with a list of appropriate External Examiners recommended by the thesis supervisor and the Graduate Officer. A Dissertation Examination Chair will be appointed by the Dean of Graduate Studies.

Other interested members of the University community may attend the oral examination.

6.3 Part-time Studies

This program will mainly be offered on a full-time basis. However, students may also be accepted as part-time students.

6.4 Curriculum

The courses and seminars offered in the program are:

- SUSM 701: Advanced theories (0.5 units weight)
- SUSM 702: Research design and methods (0.5 units weight)
- Two elective courses: The elective courses may serve to fill a gap in the student's background for the proposed research, or to provide more detailed understanding of a crucial area, or more generally to broaden the student's base of advanced understanding. The mandatory elective course must be taken at the graduate level. (0.5 units weight each)
- Two of the following PhD Professional Development Seminars (counted as milestones):
    - Consulting
    - Evaluation
    - Analysis and research

The course descriptions, using standard forms for curriculum approval at Senate Graduate and Research Committee, are presented in Annex I.

Course sequence for full-time students

According to the university's guideline the minimum required enrolment period for the Doctoral degree is six terms (two years) from completion of a Master's degree, and has the maximum period for full time students as twelve terms (four years) from completion of the Master's degree, though time extensions may be granted. The proposed program will follow this guideline.

The full-time students are expected to complete their course requirements excluding the seminars within their first two terms. The seminars should have been finished before the dissertation defense. Table 11 describes the course and milestones sequence for the minimum period. It is recognized that many students will require four years to complete their degree, and the funding guarantee is for four years.

Table 11: Course and milestones sequence (minimum period)

Year 1		
Fall	SUSM 701 (0.5 credits)	Elective (0.5 credits)
Winter	SUSM 702 (0.5 credits)	Elective (0.5 credits)
Spring		Seminar (milestone)
Year 2		
Fall	Comprehensive examination	
Winter	PhD thesis proposal	Seminar
Spring		
Year 3		
Fall	Dissertation defence (milestone)	

6.5 Collateral and Supporting Departments

The faculty of environment provides an open access approach among its units for students to take electives in other programs. There are joint research projects of members of the faculty that work in different departments. In addition, members of SEED and of the faculty are members of different research institutes of the University of Waterloo such as the Waterloo Institute for Sustainable Energy (WISE) or the Water Institute. Through cross listing members of the faculty will be able to supervise students from SEED's PhD program as well. Furthermore, members of the faculty contribute to the graduate teaching through cross-listed electives.

6.6 Organizational Structure

The PhD program bases on SEED as an academic department of the Faculty for Environment. The organizational structure of the program is depicted above. Overall responsibility for the program rests with the SEED director. As SEED is a department of the Faculty for Environment the Associate Dean Graduate Studies and his administrative staff will support the program. In addition, a graduate program administrator is responsible for administrative issues of SEED's graduate programs. The organizational chart representing this structure is presented in Figure 2.

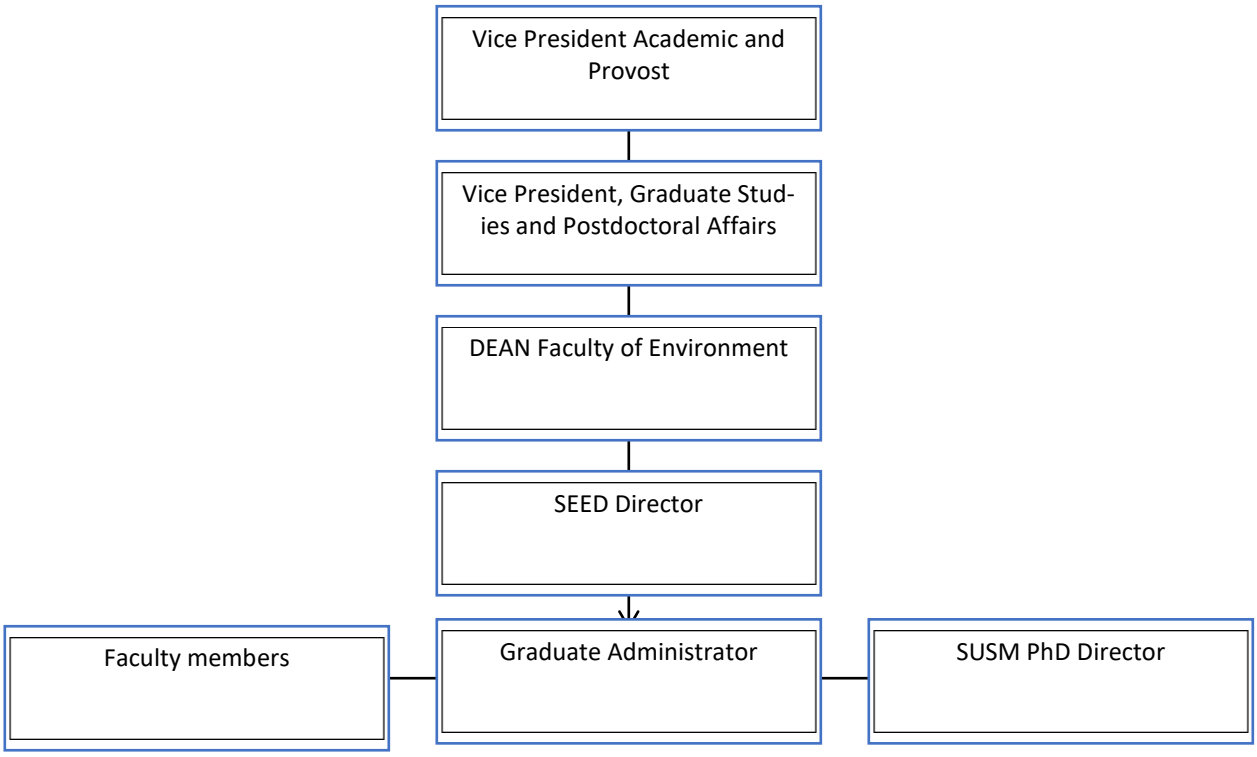

Figure 2: Organizational Chart

6.7 PROJECTED ENROLMENT

The projected enrolment for the next 7 years, full and part time is presented in Table 12. The intake of international students will follow the strategic plan of the University of Waterloo to have about 20-30 per cent of international students.

Table 12: Projected intake and enrolment

Year	Full-time		Part-time		Total Enrolment
	Intake	Enrolments	Intake	Enrolments	Total
2017/18	8	8	2	2	10
2018/19	10	18	2	4	22
2019/20	10	28	2	6	34
2020/21	10	38	2	8	46
2021/22	12	40	2	10	50
2022/23	12	50	2	10	60

7 FINANCIAL PLAN

Institutional Analysis & Planning has reviewed the proposed PhD in Sustainability Management, and has not identified any significant financial challenges to this proposal proceeding. The program has also attested that the majority of the resources required to run the program such as professor resourcing and space requirements are already in place. IAP has completed a Financial Viability Analysis (FVA) for the proposed program which demonstrated that the expected revenues from the proposed student enrolment will sustain the allocated expenditures in salaries, financial aid and a proration of indirect support unit costs in the near future. Please note that if assumptions in the FVA materially change, it is advised that IAP should be consulted to prepare an FVA update to ensure successful financial sustainability of the program. The FVA for this proposed program was approved by Provost Ian Orchard on January 12th, 2017.

8 ANNEX I COURSE AND SEMINAR DESCRIPTIONS

Effective date of implementation	Fall 2018
Subject Code:	SUSM
Course number:	701
Course Title:	Theories of Sustainability Management
Short Title:	Theories of Sustainability Management
Grading Basis:	Numerical
Consent:	Yes
Credit:	0.5
Course Description: The object of this course would be to understand theory in terms of epistemology, review major theoretical paradigms in the social sciences, understand the relationship of theory to ontology and methodology, and with regard to theory application in sustainability management. Students should show the capacity to identify, use and potentially build theories in sustainability and in management in relation to their research questions.	
Meet Type:	Lecture
Primary Meet Type:	Lecture
Special Topics Course:	No
Crosslistings:	No
Sections combined/heldwith:	No
Rationale: Achieving a systematic understanding of knowledge and a critical awareness of theories in sustainability and management research will be needed to conduct research on a PhD level and to pursue both an academic and non-academic career.	

Effective date of implementation	Winter 2018
Subject Code:	SUSM
Course number:	702
Course Title:	Methods of Sustainability Management
Short Title:	Methods of Sustainability Management
Grading Basis:	Numerical
Consent:	Yes
Credit:	0.5
Course Description: This course would take an overview of the research design process, linking theory and methodology to research questions focusing on sustainability management. The relationship between inductive and deductive methods, between theory building and theory testing will be explored and students introduced to some of the major methodological approaches – qualitative and quantitative approaches as well as survey research, statistical methodologies, and methods in industrial ecology.	
Meet Type:	Lecture
Primary Meet Type:	Lecture
Special Topics Course:	No
Crosslistings:	No
Sections combined/heldwith:	No
Rationale: Students need to know about the relationships between different methodologies and the basis on which to select methods. The course prepares students sufficiently so that they could make a choice between different methodological approaches in order to prepare the outline of their research.	

Effective date of implementation	Fall 2018
Subject Code:	SUSM
Course number:	775
Course Title:	Topics in Sustainability Management
Short Title:	Topics in Sustainability Management
Grading Basis:	Numerical
Consent:	Yes
Credit:	0.5
Course Description: Reading course	
Meet Type:	Seminar
Primary Meet Type:	Seminar
Special Topics Course:	No
Crosslistings:	No
Sections combined/heldwith:	No
Rationale: Reading course for doctoral students in the SUSM PhD program	

Effective date of implementation	Spring 2018
Course Title:	Consulting Seminar
Short Title:	Consulting Seminar
Grading Basis:	Credit / No Credit
Consent:	Yes
Credit:	Milestone
Description: This seminar uses a problem based learning approach to teach skills that are needed for the consulting practice. Students should find a client to be a consultant for and create a consulting concept in cooperation with the client. The concept should base on the current academic and non-academic literature and on reports and other non-academic resources. The goal of the seminar is to conduct the consulting project that will be finished with a report. Instructors will be from SEED and from consulting practice. The final assignment will be marked by the instructor, the students' supervisors, and the external project client.	
Meet Type:	Seminar
Primary Meet Type:	Seminar
Special Topics Course:	No
Crosslistings:	No
Sections combined/heldwith:	No
Rationale: Students should be prepared to consulting jobs that are not in the academic world. Therefore, the seminar will prepare students to acquire, plan and to conduct consulting jobs and to write consulting reports.	

Effective date of implementation	Spring 2018
Course Title:	Evaluation Seminar
Short Title:	Evaluation Seminar
Grading Basis:	Credit / No Credit
Consent:	Yes
Credit:	Milestone
Description: This seminar uses a problem based learning approach to teach skills that are needed to conduct evaluations. Students should find a client to be an evaluator for and create an evaluation concept in cooperation with the client. The concept should base on the current academic and non-academic literature and on reports and other non-academic resources. The goal of the seminar is to conduct the evaluation that will be finished with a report. Instructors will be from SEED and from practice. The final assignment will be marked by the instructor, the students' supervisors, and the external project client.	
Meet Type:	Seminar
Primary Meet Type:	Seminar
Special Topics Course:	No
Crosslistings:	No
Sections combined/heldwith:	No
Rationale: Students should be prepared to conduct evaluations, such as program evaluations, that are not in the academic world. Therefore, the seminar will prepare students to acquire, plan and to conduct an evaluation and to write evaluation reports.	

Effective date of implementation	Spring 2018
Course Title:	Research and Analysis Seminar
Short Title:	Research and Analysis Seminar
Grading Basis:	Credit / No Credit
Consent:	Yes
Credit:	Milestone
Course Description: This seminar uses a problem based learning approach to teach skills that are needed for the consulting practice. Ideally, students should find a client with a specific problem, one that requires a process of stakeholder engagement to resolve. The seminar will introduce students to the fundamental principles of scoping a presenting problem, designing a process to help deliver a solution, facilitating that process, and writing a report. The client can be from the private, public or not for profit sector, but the emphasis should be on complex problems that require multiple stakeholders to resolve, as opposed to technical problems to be studied and resolved by an analyst. Nonetheless some of the skills taught, particularly in the section on scoping and on report writing, will be useful for analysts as well. Instructors will be from SEED and from consulting/process design practice. The final assignment will be marked by the instructor, the students' supervisors, and the external project client.	
Meet Type:	Block Seminar
Primary Meet Type:	Seminar
Special Topics Course:	No
Crosslistings:	No
Sections combined/heldwith:	No
Rationale: Students should be prepared to conduct research and analysis, such as customer research, that are not in the academic world. Therefore, the seminar will prepare students to acquire, plan and to conduct research and analysis and to write research reports.	

Annex 2

UNIVERSITY OF WATERLOO

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 Office.

Faculty: Environment

Program: Doctor of Philosophy (PhD) in Sustainability Management

Program contact name(s): Simron Singh

Form completed by:

8.1 Description of proposed changes:

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

See attached program proposal.

Is this a major modification to the program? Yes

Rationale for change(s):

See attached program proposal.

Proposed effective date: Term: Fall Year: 2018

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/environment/school-environment-enterprise-and-development-seed

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:

No current content.	**Doctor of Philosophy (PhD) in Sustainability Management**
	
	Program information
	
	• **Admit term(s)**
	  ○ Fall
	• **Delivery mode**
	  ○ On-campus
	• **Program type**
	  ○ Doctoral
	  ○ Research
	• **Registration option(s)**

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
	○ Full-time ○ Part-time • **Study option(s)** ○ Thesis **Admission requirements** • **Minimum requirements** ○ A Master's degree with distinction (typically an overall average of at least 80%, or equivalent). ○ Facility with research methods is expected, whether through the presentation of specific graduate courses or original research at the graduate level. • **Application materials** ○ Résumé ○ Supplementary information form ○ Transcript(s) • **References** ○ Number of references: 3 ○ Type of references: academic references are required unless a professional reference is specified. • **English language proficiency (ELP) (if applicable)** **Degree requirements** **Thesis option:** • **Graduate Academic Integrity Module (Graduate AIM)** • **Courses** ○ Students must complete the following courses: ▪ SUSM 701 Advanced theories ▪ SUSM 702 Research design and methods ▪ 2 elective courses ○ Students may request permission from the SEED Graduate Advisor to enroll in elective courses in other graduate programs that will complement their program of study. • **Link(s) to courses** ○ Sustainability Management (SUSM) courses ○ Graduate course search • **PhD Professional Development Seminars**

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
	○ The PhD Professional Development Seminars will allow students to prepare for jobs inside and outside of academia and focus on the application of theories, concepts and methods that students have acquired in their core courses. They are oriented to enable students to achieve skills in academic research, consulting and evaluations and to conduct knowledge mobilization. In these seminars students develop a project proposal, an evaluation plan, or the outline for a consulting project. The results will be marked by the course instructor, the students' supervisors, and an external 'client' of the course project. • **PhD Comprehensive Examination** ○ The PhD Comprehensive Examination requires students to demonstrate their knowledge of the literature in sustainability management and be assessed on their breadth and depth of their knowledge as well as their ability to present their arguments in a coherent, logical and scientific manner. The comprehensive examination has to be conducted during the fourth academic term of the student's first enrolment in the PhD program. The comprehensive examination committee will be set each year and consists of the school's graduate officer and at least two committee members from the school, depending on the candidates being examined. The comprehensive exam consists of a single written question based on a list of publications that will be set each year by the school. The written comprehensive exam will be on a set date each fall. The student's response must be submitted within a stipulated time frame (likely to be 8 to 24 hours) following receipt of the question and must be no longer than 5,000 words, not including the bibliography. Exams will be marked by (at least) two comprehensive examination committee readers and results will be compiled by the graduate officer. In case of disagreement by the committee, or where it would be fairer

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:

	to the candidate (e.g., in some English-second language cases) the candidate would additionally be examined orally by the committee. The oral examination, if required, is chaired by a faculty member of SEED who is not a committee member. Accommodations to this process will be determined for students unable to write the exam on the set date or other circumstances, as appropriate.
	• **PhD Thesis Proposal**
	  ○ Students present the research proposal to their doctoral advisory committee that has been set up, consisting of the supervisor, two committee members from the school, and one internal-external member who is not appointed or cross-appointed as SEED faculty. The research proposal consists of a written and an oral part. The milestone will be completed shortly (within a term) after the comprehensive examination. Students send the proposal in a written form to the committee members, gets their feedback and integrates the feedback into the proposal. The research proposal is accepted if all committee members agree to accept it. The decision will be communicated to the school's graduate officer. The approved proposal is binding to both the student and the advisory committee.
	• **PhD Thesis**
	  ○ The thesis should address original research and can be written either in form of a monograph or as a pa-per-based thesis. The thesis has to be presented in a public defense in front of a doctoral defence committee consisting of the members of the student's doctoral advisory examination committee and an external member who is not a faculty member of the University of Waterloo and who has not been involved in the candidate's research. After the presentation the committee asks questions about and pro-vides comments to the thesis and the presentation.

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

Not applicable.

Departmental approval date (mm/dd/yy):
Reviewed by GSO (for GSO use only) ☒ date (mm/dd/yy): 10/06/2017
Faculty approval date (10/05/2017):
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
20 November 2017

Senate Undergraduate Council met on 17 October 2017 and recommends that the following be submitted to Senate for approval as part of the regular agenda.

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

FOR APPROVAL

NEW ACADEMIC PLANS

Faculty of Engineering
Architectural Engineering

1. **Motion:** That Senate approve the proposed new plan in architectural engineering as described in attachment #1, effective 1 September 2018.

   Rationale:
   The Architectural Engineering program, to be offered by the Department of Civil and Environmental Engineering in collaboration with the School of Architecture, is designed to produce graduates with broad, yet technically deep, skills capable of responding to the unique and emerging challenges currently confronting the building industry. Exposing students to a world of design excellence through this academic program will ensure that the skills taught will be used to develop the best solutions, while teaching communication in multiple media will guarantee that these solutions are understood and supported by all of the stakeholders in the building industry.

   The following is a high-level summary of the program:
   - Interdisciplinary co-op program which brings together issues such as design, aesthetics, culture, environment, and professionalism in the context of engineered buildings.
   - Each term will include an architectural engineering class held in a studio setting. In terms 3A and 3B, classes will be taken alongside architecture students at the School of Architecture.
   - The program considers sustainability and environmental concerns of the built environment to be a fundamental part of all engineering design. As such, sustainability is not taught as a separate course, but is integrated into all design decisions and an input or constraint to all relevant analysis.
   - Learning outcomes were determined to ensure that the students develop theoretical, practical and professional skills consistent with the UW Undergraduate Degree Learning Outcomes and the Canadian Engineering Accreditation Board outcomes/attributes.
   - Steady state class size will be 85 students.

   There are no other programs in Canada that teach the unique skills and knowledge proposed, and that use a studio approach to foster knowledge integration and design education. The combination of studio and co-op will also be unique in North America for a program of this kind.

Faculty of Engineering
Artificial Intelligence

2. **Motion:** That Senate approve the creation of a new option plan in artificial intelligence, as described in attachment #2, effective 1 September 2018.

   Background and Rationale: Artificial intelligence (AI) is ingrained in science/technology development and increasingly central to every day life. AI questions engage investigators across a range of disciplines,

from computer and statistical sciences; to electrical and systems design engineering; to optimization; to cognitive science; to applied health sciences; to economics; and law, among others.

A new option in AI is proposed for BASc students in all undergraduate engineering programs. The option will have an annual cap of 30 students (15 engineering and 15 computer science), so as not to generate noticeable increase in enrolment in any of the prescribed courses. The math version of the AI option is item #6 of the report.

To facilitate advisement for students interested in this option, a listing of equivalent computer science/math prerequisites for all engineering courses in the different lists will be created. A listing of equivalent engineering prerequisites for all math/computer science courses in the different lists will also be created. Some courses will have prerequisites that will need to be overridden by the instructors. Most of these courses will require minimum level 3A (ECE, SYDE, MSCI, MTE, CS and Math) prerequisites.

Faculty of Engineering
Biomedical Engineering

3. **Motion:** That Senate approve the formalization of two specialization plans in sports engineering and neural engineering, as described in attachment #3, effective 1 September 2018.

   Background and Rationale: The specializations are being proposed to support emerging disciplines in biomedical engineering.

   Neural engineering is a discipline that is rapidly developing with high relevance to medicine. The neural engineering specialization will draw from core biomedical engineering and systems design engineering curriculum, as well as introductory science and psychology courses, giving students a technical background in brain physiology, simulation and analysis methods, and brain-computer interfaces.

   Sports engineering is a multi-billion dollar industry. The sports engineering specialization will draw from the core biomedical engineering and systems design engineering curriculum, which are complemented by several technical elective courses in material science, image and signal processing, biomechanics and sports engineering.

Faculty of Environment
Southeast University 2+2 Program

4. **Motion:** That Senate approve the 2+2 arrangement with Southeast University (SEU) of China as documented in the agreement set forth in attachment #4, effective 1 September 2018.

   Background and Rationale: The purpose of the agreement is to establish a collaborative undergraduate program in the environment where students spend two years at SEU in China and two years at Waterloo campus in Canada. Waterloo and SEU will work together to select up to five students to be admitted to the program each year. Students will commence studies at SEU, and, subject to meeting all relevant academic and English language requirements, will complete their studies at Waterloo. The relevant Waterloo program for the purposes of this agreement is Honours Geomatics and Geography and Environmental Management.

Faculty of Environment
Knowledge Integration

5. **Motion:** That Senate approve the creation of a science, technology & society (STS) specialization plan as described in attachment #5, effective 1 September 2018.

   Background and Rationale: The knowledge integration (KI) degree requires students to have scientific and technological literacy, as well as knowledge of the social, political, and ethical dimensions of science

and technology. KI offers several STS-related courses and STS-themed electives, and would like to create a formal specialization to recognize this academic concentration.

Faculty of Mathematics
David R. Cheriton School of Computer Science

6. **Motion:** That Senate approve the creation of a new option plan in artificial intelligence, as described in the attachment #6, effective 1 September 2018.

   Background and Rationale: Artificial intelligence (AI) is ingrained in science/technology development and increasingly central to every day life. The AI option will be available all BCS and BMath plans, except BCS Data Science. See motion 2 above and attachment #6 for more details.

CHANGES TO ACADEMIC PLANS

Faculty of Mathematics
Statistics & Actuarial Sciences

7. **Motion:** That Senate approve the following changes for the statistics for health honours plan: (a) name change from "Statistics for Health" to "Biostatistics"; and (b) changes to required courses, as set forth in attachment #7, effective 1 September 2018.

   Background and Rationale: The external reviewers of the statistics plan commented on how low the enrollment was in the statistics for health honours plan and noted that it would be appropriate to consider changes to make it more appealing to students. The name is being updated to biostatistics to make it more consistent with the term used for the graduate programs and to ensure it is more recognisable outside of the university. The courses were chosen to help students complete the plan on various co-op sequences and to better align with the math requirements for statistics honours plan, while requiring enough specific courses to equip the students with the skills needed to find employment in biostatistics positions. See attachment #7 for more details.

INACTIVATION OF ACADEMIC PLANS

Faculty of Environment
International Development

8. **Motion:** That Senate approve the inactivation of the option plan in international development, effective 1 September 2018.

   Background and Rationale: There has been very little uptake of the option since it was introduced. Also, with the minor requirements being lessened, there is no longer a need to offer both plans.

Faculty of Mathematics
Statistics/Computer Science

9. **Motion:** That Senate approve the inactivation of the joint statistics/computer science plan, effective 1 September 2017.

   Background and Rationale: This is a housekeeping change to reflect that the existing Joint Statistics/Computer Sciences plans are becoming "Data Science" per the paperwork submitted to the Ministry.

Mario Coniglio
/rmw Associate Vice-President, Academic

Architectural Engineering

North Americans spend more than 90% of their lives inside buildings. During this time their productivity and quality of life are directly affected by the nature of the enclosed environment. Buildings also represent one of the largest components of any industrialized country's capital wealth. The resources used and the contaminants released by the construction and operation of buildings are now widely understood to have widespread impact on the environment and the economy. Future buildings will need to be more energy efficient, durable, sustainable, low maintenance, and flexible than existing buildings. Today there already exists an enormous portfolio of buildings that require repair, renovation, and rehabilitation. Managing, repairing, replacing, and retrofitting existing buildings will become an increasingly important activity in the future.

There is a pressing need to support this massive and changing industry with the proper technical knowledge and management skills. The Architectural Engineering program is designed to address this need by providing the necessary fundamentals of mathematics and the natural sciences, as well as to provide perspectives from the fields of the social sciences and humanities.

The Architectural Engineering program has “Design from Day One” as its mantra. A common Architectural Engineering class held in a studio setting is the core of each term and knits together issues such as design, aesthetics, culture, environment, and professionalism in the context of engineered buildings. A studio teaching experience, common in design-centric programs such as Architecture and Industrial Design, allows for enhanced peer-learning, better collaborative work, inspiration from surroundings, rapid modelling and prototyping, while encouraging hands-on investigations and exploration. Another of the distinctive features of the program is its 3A and 3B academic terms, during which students take their classes at the University of Waterloo Cambridge campus, immersed in the School of Architecture, working alongside architecture students.

The Architectural Engineering program is designed to produce graduates with broad, yet technically deep, skills capable of responding to the unique and emerging challenges currently confronting the building industry. Exposing graduates to a world of design excellence through this unique academic program will ensure that the skills taught will be used to develop the best solutions, while teaching communication in multiple media will guarantee that these solutions are understood and supported by all of the Stakeholders in the building industry. The program considers sustainability and environmental concerns of the built environment to be a fundamental part of all engineering design. As such, sustainability is not taught as a separate course, but is pervasive through all design decisions and an input or constraint to all relevant analysis.

Academic Program

The following program is applicable to students entering Architectural Engineering in the fall 2018 term. Note that a total of three approved Complementary Studies Electives (CSE), in addition to AE 101, AE 392, and AE 491, and eight approved Technical Electives (TE) must be completed as detailed in the following sections.

Term 1A (Fall)

AE 100 Concepts Studio
AE 101 History of the Built Environment (List D-Other CSE)
AE 104 Mechanics 1
AE 115 Linear Algebra
CHE 102 Chemistry for Engineers
MATH 116 Calculus 1 for Engineering

Term 1B (Spring)

AE 105 Mechanics 2
AE 121 Computational Methods
AE 125 Architectural Graphics Studio
GENE 123 Electrical Circuits and Instrumentation
MATH 118 Calculus 2 for Engineering

Term 2A (Winter)

AE 200 Structural Design Studio
AE 204 Solid Mechanics 1
AE 221 Advanced Calculus
AE 224 Probability and Statistics
AE 280 Fluid Mechanics and Thermal Sciences
CSE 2 Approved Complementary Studies Elective

Term 2B (Fall)

AE 205 Solid Mechanics 2
AE 223 Differential Equations and Balance Laws
AE 225 Environmental Building Studio
AE 265 Structure and Properties of Materials
CSE 3 or TE 1 Approved Complementary Studies Elective or Technical Elective
WKRPT 200 Work-term Report

Term 3A (Spring)

AE 279 Energy and the Environment
AE 300 Architectural Engineering Studio
AE 303 Structural Analysis 1
AE 353 Soil Mechanics and Foundations
ARCH 277 Timber: Design, Structure and Construction for Engineers
WKRPT 300 Work-term Report

Term 3B (Winter)

AE 310 Introduction to Structural Design
AE 325 Project 1 Studio
AE 392 Economics and Life Cycle Analysis (List B-Engineering Economics CSE)
CIVE 507 Building Science and Technology
CSE 3 or TE 1* Approved Complementary Studies Elective or Technical Elective
WKRPT 400 Work-term Report

Term 4A (Spring)

AE 400 Project 2 Studio
AE 491 Engineering Law and Ethics (List D-Other CSE)
TE 2 Approved Technical Elective
TE 3 Approved Technical Elective
TE 4 Approved Technical Elective

Term 4B (Winter)

AE 425 Project 3 Studio
CSE 6 Approved Complementary Studies Elective
TE 5 Approved Technical Elective
TE 6 Approved Technical Elective
TE 7 Approved Technical Elective
TE 8 Approved Technical Elective

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* Must be a Technical Elective (TE) if Complementary Studies Elective (CSE) is selected in a previous term, and vice versa.

Electives

Students are responsible for selecting their own program of electives, in keeping with the ultimate career objectives after graduation. The program must satisfy the requirements of the Department of Civil and Environmental Engineering (CEE). This includes having to meet minimum requirements in:

- Mathematical Foundations
- Natural Sciences
- Engineering Sciences
- Engineering Design
- Complementary Studies

Technical Electives

Students are required to complete eight (8) technical elective (TE) courses within the following requirements:

1. At least three (3) TEs must be from List A (Architectural Engineering Electives)
2. At least two (2) TEs must be from List B (Engineering Design Intensive Electives)
3. At least one (1) TE must be from List D (Natural Science Technical Electives)

Up to two (2) TEs may be technical courses from other programs; such courses must have sufficiently advanced technical content to be allowed, and will be counted as List B TEs. Further information is available from the CEE Undergraduate Office or CEE website. Some courses of interest may require prerequisite knowledge that is not part of the core program in Architectural Engineering. Students may require extra courses or may need to seek enrolment approval from the course professor if the prerequisites have not been satisfied.

The Technical Elective Lists for the Architectural Engineering program are provided below. Note that the offering of these courses is contingent upon sufficient demand and/or available teaching resources. There may be courses added and changes made to the content, term of offering, or meet times from what is listed below. Further information is available from the CEE Undergraduate Office or CEE website.

Key for List A, B, and C:

Term courses are offered: F=Fall term, W=Winter term, S=Spring term

List A - Architectural Engineering Technical Electives

Course	Title	Term
AE 301	Building Enclosure Systems	W
AE 315	Building Structural Systems	W
AE 405	Building Performance Measurement Lab	S
AE 450	Building Service Systems	S
ARCH 570	Building Technology and Environmental Courses	W
ME 452	Energy Transfer in Buildings	W

List B - Engineering Design Intensive Technical Electives

Course	Title	Term
ARCH 263	Integrated Environmental Systems	F
ARCH 465	Advanced Structures: Design and Analysis	F
CIVE 343	Traffic Simulation Modelling and Applications	F
CIVE 354	Geotechnical Engineering 2	F
CIVE 413	Structural Steel Design	S
CIVE 414	Structural Concrete Design	S
CIVE 415	Structural System Design	W
CIVE 497	Special Topics in Civil Engineering	F
CIVE 512	Rehabilitation of Structures	W

List C - Engineering Technical Electives

Course	Title	Term
CIVE 306	Mechanics of Solids 3	F
CIVE 422	Finite Element Analysis	W
CIVE 484	Physical Infrastructure Planning	S
CIVE 505	Structural Dynamics	W

List D - Natural Science Technical Electives

BIOL 150 Organismal and Evolutionary Ecology
BIOL 240 Fundamentals of Microbiology
BIOL 273 Principles of Human Physiology 1
CHE 161 Engineering Biology
CHEM 209 Introductory Spectroscopy and Structure

CHEM 217 Chemical Bonding
CHEM 262 Organic Chemistry for Engineering
EARTH 221 Geochemistry 1
EARTH 270 Disasters and Natural Hazards
EARTH 281 Geological Impacts on Human Health
ENVS 200 Field Ecology
KIN 100 Human Anatomy: Limbs and Trunk
PHYS 124 Modern Physics
PHYS 125 Physics for Engineers
SCI 238 Introductory Astronomy

Complementary Studies Electives

Three Complementary Studies Elective (CSE) courses in approved non-technical subjects must be taken. The CSEs are in addition to those courses which are part of the core program and contain complementary studies material, such as AE 101 (List D), AE 392 (List B) and AE 491 (List D). The CSE courses are organized on a Faculty basis and detailed in this calendar, under the Complementary Studies in the Faculty of Engineering page. The three (3) CSE courses are to be chosen according to the following constraints:

- One course from List A - Impact Courses,
- Two courses from List C - Humanities and Social Sciences Courses

Faculty Options

Complete details of designated options available to engineering students are provided in this Calendar in the Engineering section entitled Options, Specializations and Electives for Engineering students. Students who satisfy the option requirements will have the appropriate designation shown on their transcript and diploma. The following option may be of interest to Architectural Engineering students. (Note: To qualify for these options, students must achieve a grade of at least 50% in each course and must obtain a cumulative average of 60% or more in these courses.)

Option in Management Sciences

The Option in Management Sciences provides an understanding of the issues, concepts and techniques related to the management of technology. The Option consists of a sequence of six courses. Students who wish to follow the Management Sciences Option must declare their intent before starting the 2B term. For further details see the Management Sciences website.

Accelerated Master's Program in Engineering

The Faculty of Engineering offers an Accelerated Master's Program. See Accelerated Master's Programs in Engineering for more details.

Option in Artificial Intelligence (Engineering)

The extent to which Artificial Intelligence (AI) is now ingrained in science/technology development and increasingly central to everyday life is captured in the report and mission of the international One Hundred Year Study on Artificial Intelligence (September 2016). AI advances strive to achieve, to ever-greater degrees of efficacy, reliability and safety, the ways in which machines and systems perceive, see, speak, decide, respond, act and plan. AI questions engage investigators across a range of disciplines, from computer and statistical sciences; to electrical and systems design engineering; to optimization; cognitive science; applied health sciences; economics; and law, among others.

The AI Option will be available for Bachelor of Applied Science (BASc) students in all undergraduate engineering programs at the University of Waterloo. The requirements for option completion are:

All of
ECE 457A Cooperative and Adaptive Algorithms, or MSCI 435 Advanced Optimization Techniques
MSCI 442 Impact of Information Systems on Organizations and Society

One of
CS 480 Introduction to Machine Learning
ECE 457B Fundamentals of Computational Intelligence
MSCI 446 Data Warehousing and Mining

One of
BME 356 Control Systems
CHE 420 Introduction to Process Control
ECE 380 Analog Control Systems
MTE 360 Automatic Control Systems
SE 380 Introduction to Feedback Control
SYDE 352 Introduction to Control Systems

Three additional courses from
CHE 522 Advanced Process Dynamics and Control
CHE 524 Process Control Laboratory
CO 456 Introduction to Game Theory
CO 463 Convex Optimization and Analysis
CO 466 Continuous Optimization
CS 452 Real-time Programming (only for Math/Computer Science students)
CS 480 Introduction to Machine Learning
CS 484 Computational Vision
CS 485 Statistical and Computational Foundations of Machine Learning
ECE 423 Embedded Computer Systems
ECE 481 Digital Control Systems
ECE 486 Robot Dynamics and Control
ECE 488 Multivariable Control Systems
MSCI 446 Data Warehousing and Mining
MTE 544 Autonomous Mobile Robots
STAT 341 Computational Statistics and Data Analysis
STAT 440 Computational Inference
STAT 441 Statistical Learning - Classification
STAT 444 Statistical Learning - Function Estimation
SYDE 372 Introduction to Pattern Recognition
SYDE 522 Machine Intelligence
SYDE 556 Simulating Neurobiological Systems

Note: At least one of the “Three additional courses” must be from Math and at least one from Engineering. Special topics courses may sometimes be appropriate for this option; interested students should see the option co-ordinator for confirmation.

Biomedical Engineering

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Technical Studies Electives (TEs)

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

The Department of Systems Design Engineering offers a wide variety of technical elective courses in the third and fourth year. In the Biomedical Engineering program, students are encouraged to design their own elective program to develop expertise in their particular interest area. Approved technical elective courses are available from Systems Design Engineering, from other Engineering departments, and from a wide list of technical courses in the faculties of Science and Mathematics. **Students may choose to take their technical electives from a more restricted list to receive the Specialization in Neural Engineering or Sports Engineering.** Only courses from Engineering and Computer Science will contribute towards CEAB hours in the categories of "Engineering Science" and "Engineering Design."

~~**Technical Elective Packages**~~

~~The Biomedical Engineering program committee has identified two technical elective areas within its current offerings. Additional information regarding elective packages may be obtained from the Associate Chair for Undergraduate Studies. Students may choose a technical elective package from the areas identified below to help them in their selection of technical electives. Choosing a specific elective package is not mandatory. Students do not receive any official notification on their transcript for completing an elective package. However, students may find it possible to arrange their electives in such a way as to complete the requirements for one or more Faculty of Engineering Approved Options. To do this, students with sufficiently high grades are encouraged, subject to approval from the program director, to supplement their program with extra courses, online courses or courses taken at another university.~~

~~**Sports Engineering**~~

~~Sports Engineering has grown from a hobby of Isaac Newton and Lord Rayleigh to a multi-billion dollar industry, and today's athlete is highly dependent on the design and performance of their equipment and training systems. The modern sports engineer must be familiar with a wide range of topics ranging from sport biomechanics and light-weight materials to mechatronic system dynamics and control.~~

~~The sports engineering package requires a two-term capstone project on the design of a new sports equipment or training device, plus two required courses in biomechanics and sports engineering. A complementary set of three more technical electives will give the sports engineering student the broad range of skills required for this emerging discipline.~~

~~Required courses in Biomedical Engineering:~~

- ~~BME 461 and BME 462, the capstone design project. Students in Sports Engineering will focus their project on the design of a new sporting equipment or training device. The project must be pre-approved by the co-ordinator for Sports Engineering.~~
- ~~BME XXX, Sports Engineering technical elective, which provides the necessary background on sports equipment design, training devices, and their interaction with the athlete.~~
- ~~BME XXY, Biomechanics of Human Movement technical elective, which provides the necessary background on the musculoskeletal dynamics and optimal performance of athletes.~~

~~Three of the following courses must also be taken:~~

~~CIVE 422 Finite Element Analysis or ME 559 Finite Element Methods~~
~~KIN 340 Musculoskeletal Injuries in Work and Sport~~
~~KIN 341 Selected Topics in Sport and Work Injuries~~
~~MSCI 423 Managing New Product and Process Innovation ME 524 or SYDE 553 Advanced Dynamics~~
~~ME 533 Non-metallic and Composite Materials~~
~~ME 555 Computer-Aided Design~~
~~ME 564 Aerodynamics~~
~~ME 566 Computational Fluid Dynamics for Engineering Design~~
~~SYDE 544 Biomedical Measurement and Signal Processing~~
~~SYDE 575 Image Processing~~

~~Neuroscience~~

~~Neuroscience is a rapidly developing field with high relevance to medicine. Four of the ten highest-impact diseases in terms of years lost to disability are brain-related (World Health Organization, 2004, The Global Burden of Disease). Brain-inspired artificial systems are also emerging. Several Fortune-500 companies are pursuing computational brain modelling for the purpose of developing new brain-like technology.~~

~~Students focusing on neuroscience will draw from the core engineering and introductory biology courses, giving students a technical introduction to brain physiology, simulation, and analysis methods, and brain-computer interfaces.~~

~~The neuroscience course package consists of six specific required courses plus one additional course drawn from a list. The required courses include a two-term capstone project (BME 461 and BME 462), and two biology courses (BIOL 376 and BIOL 377) that cover a wide range of neuroscience topics, from molecular to large-system levels. There are also two engineering courses (SYDE 556 and 5XX) that cover modelling and analysis of neural systems, and brain-computer interfaces.~~

~~All of the following courses are required:~~

- ~~BME 461 and BME 462, the capstone design project. Students in Neuroscience will focus their project on the design of a brain-like technology or a new device or model involving brain physiology or brain-computer interfaces. The project must be pre-approved by the co-ordinator for Neuroscience.~~
- ~~BME 5XX Computational Neuroscience~~
- ~~BIOL 376 Cellular Neurophysiology~~

- ~~BIOL 377 Systems Neuroscience: From Neurons to Behaviour~~
- ~~SYDE 556 Simulating Neurobiological Systems~~

~~One of the following courses must also be taken:~~

~~(Note: Biomedical Engineering students may lack prerequisites for many of these courses, and will have to obtain permission of the instructor. However, there are several Systems Design engineering (SYDE) courses in the list and other courses, where students will have the appropriate prerequisites, as shown with an asterisk beside it).~~

~~AMATH 382 or BIOL 382* Computational Modelling of Cellular Systems~~
~~AMATH 451* Introduction to Dynamical Systems~~
~~KIN 155* Introduction to Neuroscience for Kinesiology~~
~~KIN 301* Human Anatomy of the Central Nervous System~~
~~KIN 416 Neuromuscular Integration~~
~~KIN 456 Cognitive Dysfunction and Motor Skill~~
~~OPTOM 243 Neurophysiology of Vision~~
~~PHIL 256 or PSYCH 256* Introduction to Cognitive Science~~
~~PHIL 446 or PSYCH 446 Cognitive Modelling~~
~~PSYCH 207* Cognitive Processes~~
~~PSYCH 261 Physiological Psychology~~
~~PSYCH 307 Human Neuropsychology~~
~~PSYCH 396 Research in Behavioural Neuroscience~~
~~SYDE 372* Introduction to Pattern Recognition~~
~~SYDE 522* Machine Intelligence~~
~~SYDE 558* Fuzzy Logic and Neural Networks~~

Specializations

Neural Engineering Specialization

Neural Engineering is a discipline within Biomedical Engineering that is rapidly developing with high relevance to medicine. Four of the ten highest-impact diseases in terms of years lost to disability are brain-related (World Health Organization, The Global Burden of Disease). Brain-inspired artificial systems are also rapidly emerging. Several Fortune-500 companies are pursuing computational brain modelling for the purpose of developing new brain-like technology.

The Neural Engineering Specialization will draw from the core Biomedical Engineering and Systems Design Engineering curriculum as well as introductory science and psychology courses, giving students a technical background in brain physiology, simulation and analysis methods, and brain-computer interfaces.

Requirements

The Neural Engineering Specialization consists of seven courses covering a wide range of neuroscience topics and computational applications in neuroscience. Students are also required to do their capstone design project (BME 461/GENE 403/SYDE 461 and BME 462/GENE 404/SYDE 462) with a focus on neuroscience applications. The project must be approved by the Co-ordinator of the Neural Engineering Specialization. An average of at least 60% in the seven 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 461 Biomedical Engineering Design Workshop 2 or GENE 403 Interdisciplinary Design Project 1 or SYDE 461 Systems Design Workshop 2**
- **BME 462 Biomedical Engineering Design Workshop 3 or GENE 404 Interdisciplinary Design Project 2 or SYDE 462 Systems Design Workshop 3**
- **SYDE 552 Computational Neuroscience or SYDE 556 Simulating Neurobiological Systems**

Two courses from list A (anatomy and physiology of the nervous system)

- **BIOL 376 Cellular Neurophysiology (offered fall for odd years)***
- **BIOL 377 Systems Neuroscience: From Neurons to Behaviour (offered fall for even years)***
- **KIN 255 Fundamentals of Neuroscience***
- **KIN 301 Human Anatomy of the Central Nervous System**
- **KIN 416 Neuromuscular Integration**
- **PHIL 256/PSYCH 256 Introduction to Cognitive Science*[A]**
- **PSYCH 261 Physiological Psychology (*Prereq: PSYCH 101*)**
- **PSYCH 307 Human Neuropsychology[A]**

One course from list B (computational applications in neuroscience)

- **AMATH 451 Introduction to Dynamical Systems**
- **AMATH 382/BIOL 382 Computational Modelling of Cellular Systems***
- **BME 487 Special Topics in Biomedical Signals (requires approval from the Co-ordinator of the Neural Engineering Specialization)**
- **BME 499 Elective Biomedical Research Project (requires approval from the Co-ordinator of the Neural Engineering Specialization)**
- **STAT 441 Statistical Learning – Classification**
- **STAT 444 Statistical Learning – Function Estimation**
- **SYDE 372 Introduction to Pattern Recognition***
- **SYDE 522 Machine Intelligence***
- **SYDE 552 Computational Neuroscience***
- **SYDE 556 Simulating Neurobiological Systems***

One additional course from either list A or B

Note 1: It is the student's responsibility to ensure that their course selection meets the Biomedical Engineering program requirements as well as the CEAB requirements, which include a minimum number of instruction hours in the various CEAB categories. Some courses in List A (identified by [A]) can be counted towards Complementary Studies Requirements.

Note 2: Biomedical Engineering students may lack prerequisites for some of these courses and should ensure that they obtain the prerequisite courses prior to taking such courses. However, there are several courses in the list, as identified by an asterisk, where students will have the appropriate prerequisites.

Sports Engineering Specialization

Sports Engineering has grown from a hobby of Isaac Newton and Lord Rayleigh to a multi-billion dollar industry, and today's athlete is highly dependent on the design and performance of their equipment and training systems. The modern sports engineer must be familiar with a wide range of topics ranging from sport biomechanics and light-weight materials to mechatronic system dynamics and control.

The Sports Engineering Specialization will draw from the core Biomedical Engineering and Systems Design Engineering curriculum which are complemented by several technical elective courses in material science, image and signal processing, biomechanics and sports engineering to give students specializing in sports engineering the broad range of skills required for this emerging discipline.

Requirements

The Sports Engineering Specialization consists of two specific required TE courses, which provide the necessary background on the musculoskeletal dynamics and optimal performance of athletes as well as sports equipment design, training devices, and their interaction with the athlete, plus three additional courses drawn from the provided list. Students are also required to do their capstone design project (BME 461/GENE 403/SYDE 461 and BME 462/GENE 404/SYDE 462) with a focus on the design of a new sport equipment or training device. The project must be approved by the Co-ordinator of the Sports Engineering Specialization. An average of at least 60% in the seven 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 450 Sports Engineering
- BME 451 Biomechanics of Human Movement
- BME 461 Biomedical Engineering Design Workshop 2 or GENE 403 Interdisciplinary Design Project 1 or SYDE 461 Systems Design Workshop 2
- BME 462 Biomedical Engineering Design Workshop 3 or GENE 404 Interdisciplinary Design Project 2 or SYDE 462 Systems Design Workshop 3

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

- BME 488 Special Topics in Biomechanics
- BME 499 Elective Biomedical Research Project (requires approval from the Co-ordinator of the Sports Engineering Specialization)
- CIVE 460 Engineering Biomechanics
- ECE 417 or SYDE 575 Image Processing
- KIN 340 Musculoskeletal Injuries in Work and Sport
- ME 362 Fluid Mechanics 2
- ME 533 Non-metallic and Composite Materials
- ME 559 Finite Element Methods
- SYDE 544 Biomedical Measurement and Signal Processing

- **SYDE 553 Advanced Dynamics**

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

Faculty of Engineering Approved Options

The following is a list of Faculty approved options:

Biomechanics
Computer Engineering
Environmental Engineering
International Studies in Engineering
Management Sciences
Mathematics
Mechatronics
Statistics
Water Resources

Students who complete the requirements for these designated options will receive a final academic transcript from the University of Waterloo with a statement that the option has been successfully completed. Students should refer to the option section of this Calendar for further information or contact the option co-ordinator.

Biomedical Engineering

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Technical Studies Electives (TEs)

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

The Department of Systems Design Engineering offers a wide variety of technical elective courses in the third and fourth year. In the Biomedical Engineering program, students are encouraged to design their own elective program to develop expertise in their particular interest area. Approved technical elective courses are available from Systems Design Engineering, from other Engineering departments, and from a wide list of technical courses in the faculties of Science and Mathematics. Students may choose to take their technical electives from a more restricted list to receive the Specialization in Neural Engineering or Sports Engineering. Only courses from Engineering and Computer Science will contribute towards CEAB hours in the categories of "Engineering Science" and "Engineering Design."

Specializations

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Neural Engineering is a discipline within Biomedical Engineering that is rapidly developing with high relevance to medicine. Four of the ten highest-impact diseases in terms of years lost to disability are brain-related (World Health Organization, The Global Burden of Disease). Brain-inspired artificial systems are also rapidly emerging. Several Fortune-500 companies are pursuing computational brain modelling for the purpose of developing new brain-like technology.

The Neural Engineering Specialization will draw from the core Biomedical Engineering and Systems Design Engineering curriculum as well as introductory science and psychology courses, giving students a technical background in brain physiology, simulation and analysis methods, and brain-computer interfaces.

Requirements

The Neural Engineering Specialization consists of seven courses covering a wide range of neuroscience topics and computational applications in neuroscience. Students are also required to do their capstone design project (BME 461/GENE 403/SYDE 461 and BME 462/GENE 404/SYDE 462) with a focus on neuroscience applications. The project must be approved by the Co-ordinator of the Neural Engineering Specialization. An average of at least 60% in the seven 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 461 Biomedical Engineering Design Workshop 2 or GENE 403 Interdisciplinary Design Project 1 or SYDE 461 Systems Design Workshop 2
- BME 462 Biomedical Engineering Design Workshop 3 or GENE 404 Interdisciplinary Design Project 2 or SYDE 462 Systems Design Workshop 3
- SYDE 552 Computational Neuroscience or SYDE 556 Simulating Neurobiological Systems

Two courses from list A (anatomy and physiology of the nervous system)

- BIOL 376 Cellular Neurophysiology (offered fall for odd years)*
- BIOL 377 Systems Neuroscience: From Neurons to Behaviour (offered fall for even years)*
- KIN 255 Fundamentals of Neuroscience*
- KIN 301 Human Anatomy of the Central Nervous System
- KIN 416 Neuromuscular Integration
- PHIL 256/PSYCH 256 Introduction to Cognitive Science*[A]
- PSYCH 261 Physiological Psychology (Prereq: PSYCH 101)
- PSYCH 307 Human Neuropsychology[A]

One course from list B (computational applications in neuroscience)

- AMATH 451 Introduction to Dynamical Systems
- AMATH 382/BIOL 382 Computational Modelling of Cellular Systems*
- BME 487 Special Topics in Biomedical Signals (requires approval from the Co-ordinator of the Neural Engineering Specialization)
- BME 499 Elective Biomedical Research Project (requires approval from the Co-ordinator of the Neural Engineering Specialization)
- STAT 441 Statistical Learning – Classification
- STAT 444 Statistical Learning – Function Estimation
- SYDE 372 Introduction to Pattern Recognition*
- SYDE 522 Machine Intelligence*
- SYDE 552 Computational Neuroscience*
- SYDE 556 Simulating Neurobiological Systems*

One additional course from either list A or B

Note 1: It is the student's responsibility to ensure that their course selection meets the Biomedical Engineering program requirements as well as the CEAB requirements, which include a minimum number of instruction hours in the various CEAB categories. Some courses in List A (identified by [A]) can be counted towards Complementary Studies Requirements.

Note 2: Biomedical Engineering students may lack prerequisites for some of these courses and should ensure that they obtain the prerequisite courses prior to taking such courses. However, there are several courses in the list, as identified by an asterisk, where students will have the appropriate prerequisites.

Sports Engineering Specialization

Sports Engineering has grown from a hobby of Isaac Newton and Lord Rayleigh to a multi-billion dollar industry, and today's athlete is highly dependent on the design and performance of their equipment and training systems. The modern sports engineer must be familiar with a wide range of topics ranging from sport biomechanics and light-weight materials to mechatronic system dynamics and control.

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Requirements

The Sports Engineering Specialization consists of two specific required TE courses, which provide the necessary background on the musculoskeletal dynamics and optimal performance of athletes as well as sports equipment design, training devices, and their interaction with the athlete, plus three additional courses drawn from the provided list. Students are also required to do their capstone design project (BME 461/GENE 403/SYDE 461 and BME 462/GENE 404/SYDE 462) with a focus on the design of a new sport equipment or training device. The project must be approved by the Co-ordinator of the Sports Engineering Specialization. An average of at least 60% in the seven 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 450 Sports Engineering
- BME 451 Biomechanics of Human Movement
- BME 461 Biomedical Engineering Design Workshop 2 or GENE 403 Interdisciplinary Design Project 1 or SYDE 461 Systems Design Workshop 2
- BME 462 Biomedical Engineering Design Workshop 3 or GENE 404 Interdisciplinary Design Project 2 or SYDE 462 Systems Design Workshop 3

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

- BME 488 Special Topics in Biomechanics
- BME 499 Elective Biomedical Research Project (requires approval from the Co-ordinator of the Sports Engineering Specialization)
- CIVE 460 Engineering Biomechanics
- ECE 417 or SYDE 575 Image Processing
- KIN 340 Musculoskeletal Injuries in Work and Sport
- ME 362 Fluid Mechanics 2
- ME 533 Non-metallic and Composite Materials
- ME 559 Finite Element Methods
- SYDE 544 Biomedical Measurement and Signal Processing
- SYDE 553 Advanced Dynamics

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

Faculty of Engineering Approved Options

The following is a list of Faculty approved options:

Biomechanics
Computer Engineering
Environmental Engineering
International Studies in Engineering
Management Sciences
Mathematics
Mechatronics

To: Senate Undergrad Council, Faculty of Environment
From: Brendon Larson, AD UG
Date: October 17, 2017
Re: New: 2+2 agreement with Southeast University, China

THIS AGREEMENT FOR UNDERGRADUATE EDUCATIONAL COLLABORATION made this [insert date] day of [insert month], 20[..] (the "**Effective Date**")

BETWEEN:

SOUTHEAST UNIVERSITY, a university established under the laws of the People's Republic of China, with its main campus located at 2 SiPaiLou, Nanjing 210096, P. R. China
("SEU")

AND

UNIVERSITY OF WATERLOO, a university established by an Act of the Legislature of the Province of Ontario, with its main campus located at 200 University Avenue West, Waterloo Ontario, Canada N2L 3G1.
("**Waterloo**")

The parties to this agreement wish to establish a collaborative undergraduate program in the Environment (the "**Honours Geomatics and Honours Geography and Environmental Management**") where students will spend two years at SEU's campus in China and two years at Waterloo's campus in Canada.

Benefits of the Program for Waterloo are to: increase opportunities for Chinese students to experience Canadian higher education; promote Waterloo's international reputation; increase interaction with Chinese universities; expose Waterloo's students to Chinese culture and customs through interaction with SEU's students; and attract the most talented students worldwide.

Benefits of the Program for SEU are to: promote SEU's international reputation; increase interaction with Canadian universities; enhance SEU's ability to attract top students; expose SEU's students to Canadian culture and customs; and enhance the ability of SEU's graduates to compete in the national and international job markets;

The parties therefore agree as follows:

1. Admissions

1.1. Potential participants ("**Applicants**") will apply for admission to SEU through its standard procedures in any of its eligible programs.

1.2. Waterloo and SEU will work together to select up to 5 applicants for the Faculty of Environment each year to participate in the Program. Higher allotments can be negotiated with written approval from both Parties.

1.2.1. SEU will pre-select Applicants according to qualification criteria established by Waterloo.

1.2.2. SEU is responsible for making Applicants aware of the Program in order to attract the most talented students.

1.3. Admission decisions will be made by each university in accordance with this agreement, subject to each university's policies, procedures and regulations in effect at the time of the decision.

1.3.1. Applicants can apply to the following eligible undergraduate programs at Waterloo:

Honours Geomatics and Geography and Environmental Management (in the Faculty of Environment)

1.3.2. Application forms for admission to Waterloo are currently available at: http://horizon.ouac.on.ca/uw/agreements/

1.3.3. Waterloo admission deadlines and required supporting documents are subject to change. Waterloo will advise SEU of relevant deadlines on an annual basis.

1.3.4. Waterloo reserves the right to refuse Applicants based on space limitations of the Program, fiscal constraints, an Applicant's failure to meet admission standards, or external factors such as failure of the Applicant to obtain a valid student visa.

1.3.5. Minimum admission requirements to Waterloo programs include both English Language Proficiency ("**ELP**") and program specific academic requirements.

1.4. Applicants are responsible for all relevant application fees at each university unless they are waived by either university.

1.5. Students entering Year 3 of the program at UW will be offered an entrance scholarship of CAD1,000

2. Eligibility

2.1. Students wishing to enter the Program must obtain qualifying grades satisfactory to both universities.

2.2. Before entering Waterloo for study, Participating Students must:

2.2.1. Successfully complete the first two years of jointly recognized curriculum, including completing all courses with an average of 75% or greater in his/her first two years of study at SEU.

2.2.2. Meet ELP standards established by the Waterloo as described in section 8 of this agreement.

3. Registration and Required Residence

3.1. Students requiring English language proficiency training will receive an official offer of admission requiring successful completion of the appropriate English for Academic Success (EFAS) program, or the submission of a satisfactory English language proficiency test result, prior to enrolment in fulltime regular studies.

3.2. Applicants who satisfy all of the academic and ELP requirements set out in this agreement ("**Participating Students**"), will be issued an unconditional letter of acceptance.

3.3. Applicants who are accepted to Waterloo will be responsible for maintaining continuous registration at both universities.

3.4. The Program is designed for completion within four years of full-time study comprised of two years of full-time residence at SEU followed by four full-time academic terms in residence at Waterloo. The actual length of study at Waterloo will depend on the number of transfer credits and the number of courses a Participating Student takes each term.

3.5. Part-time enrolment in the Program is not permitted.

3.6. Waterloo is solely responsible for decisions regarding Participating Students' progression in years three and four of the Program.

4. **Tuition and Expenses**

4.1. Participating Students will pay tuition and incidental fees to the university at which they are in residence, as set by that university according to its usual procedures. While at Waterloo, Participating Students will be charged according to the relevant international student tuition standard.

4.2. Participating Students are solely responsible for any and all expenses incurred under this agreement including travelling, living and accommodation, books, medical care, ELP training and personal expenses.

4.3. Participating Students are solely responsible for obtaining the necessary travel and study documents (e.g., passport, study permit and temporary resident visa) and for any and all related expenses. Participating students will ensure that they maintain or renew their status on Canada in due time, and that it is their sole responsibility to do so, and that they may lose their status in the event that they do not study full –time (as defined by the host institution) in Canada.

4.4. All Participating Students and faculty who travel to Waterloo as part of the Program must maintain appropriate health insurance (and other insurance, if required) while in residence at Waterloo.

4.5. All Participating Students studying at Waterloo are required to maintain coverage from the University Health Insurance Plan (UHIP) and UW's FEDS/GSA Health and Dental Plan during the period of residence at Waterloo.

4.6. At Waterloo's discretion, Participating Students may be awarded Waterloo entrance awards. Selection will be based on high academic standing.

4.7. While resident at Waterloo, Participating Students are entitled to apply for any scholarship or bursary funds for which they are eligible.

5. **Academic Regulations.** Participating Students must comply with the regulations of the university at which they are then resident, including those governing academic and non-academic misconduct, and the ethical conduct of research.

6. **Records**

6.1. Each university will maintain official records for Participating Students during their time of residence.

6.2. Participating Students will be issued official transcripts by each university as appropriate.

6.3. Subject to applicable laws or regulations regarding privacy and access to student information, each university will transmit to the other:

6.3.1. Grades for all courses completed or attempted by Participating Students and

6.3.2. Discipline case summaries when a penalty has been imposed.

7. Transfer Credits and Degree Completion

7.1. Waterloo will grant transfer credits for the first two years of course work to Participating Students who obtain marks that are at, or above, 70% in examinations set by SEU. Only courses that qualify as either core or electives in the relevant program at Waterloo will be considered for transfer, to a maximum of 10.0 credit units (or 20 semester courses).

7.2. SEU will provide sufficient course information, including typical exam questions and student responses, to allow Waterloo to determine which of its courses qualify for Waterloo transfer credits.

7.3. Where possible, SEU will incorporate courses, information and materials from Waterloo into its curricula in order to help Participating Students to meet Waterloo prerequisites for upper year courses.

7.4. Waterloo will issue the appropriate Honours Bachelor's Degree to Participating Students who successfully fulfill all degree requirements, including requirements relating to enrolment, progression and coursework.

7.5. SEU agrees to accept returning Participating Students who cannot, for academic or other reasons, continue their study at Waterloo. For any Participating Students who return having not completed Waterloo degree requirements, SEU will assess successfully completed Waterloo courses for possible credit transfer, so that these courses may count towards degree completion at SEU.

8. English Language Proficiency Training

8.1. Waterloo's English language proficiency requirements for international students are outlined on Waterloo's admissions website (www.findoutmore.uwaterloo.ca). Students must complete one of the listed official English language proficiency tests, with satisfactory scores, for admission to fulltime regular studies.

8.2. Where possible, SEU will create opportunities for Participating Students and encourage them to take part in extracurricular English language training while resident at SEU.

8.3. Waterloo will coordinate placement of Participating Students who satisfy all conditions for admission to level 400 (for those in all Arts programs) and level 300 (for those in all Environment and Science programs) of the 6-week English for Academic Success ("EFAS") program offered through Renison University College. Students must obtain an overall average of 75% in the EFAS program to begin full-time undergraduate studies in the fall. Students who require additional intensive language training will have their enrollment deferred for up to one term (or more if required) until their English skills meet the standards.

8.4. Participating Students who are exempt from providing an ELP test score, as well as those who have successfully met one of the ELP test criteria, as published in Waterloo's Undergraduate Studies Academic Calendar, are exempt from completing the EFAS program although they are strongly recommended to take part in the program.

8.5. Participating Students who qualify are responsible for applying, enrolling in and attending the EFAS program, which will begin in mid- or late July.

8.6. Participating Students are responsible for all costs associated with the English language training.

9. Term and Termination.

9.1. The Term of this agreement will commence on the Effective Date and continue for a period of five years, unless terminated earlier in accordance herewith. The agreement will automatically renew for subsequent five year periods unless a party delivers at least 12 months' prior written notice of termination to the other party in accordance with this section.

9.2. This agreement may be terminated by either party at any time upon 12 months' written notice, provided that: (i) the termination shall not affect any other contracts between the parties (including, but not limited to exchange agreements) and any such other contracts shall be completed in accordance with their terms; and (ii) the termination shall not affect any Participating Students in good standing in the Program, who will be permitted to complete the Program in accordance with the terms of this agreement.

9.3. If a party elects to terminate this agreement pursuant to this section, all Program arrangements will cease on the effective date of the termination, save and except for arrangements regarding Participating Students in the process of completing the Program as described above. Any changes or accommodations required to permit Participating Students to complete the Program will be negotiated in good faith.

9.4. This agreement replaces any previous agreement and may be amended or modified at any time by mutual written consent of the parties. Any such amendments or modifications will take the form of letters of agreement signed by all parties in support of this agreement.

9.5. This agreement requires approval from the Senate at the University of Waterloo prior to the enrollment of students.

10. Designated Representatives. Each party will appoint a Designated Representative for co-ordination and administration of this agreement. The universities may change their Designated Representatives at any time by providing written notice.

The Designated Representative(s) for Waterloo are:

Fulu Mao
Coordinator, International Education & Student Advisor
Faculty of Environment
EV1 334, University of Waterloo
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Marilena Strambu (Central Administration)
Registrar's Office
University of Waterloo, Ontario, Canada N2L 3G1
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The Designated Representative for SEU is:

Xiao Fu

Coordinator
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Juan Wu
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Southeast University, 2 Sipailou, Nanjing 210096, P.R. China
Phone: +86 25 83792408
Email: juanwuseu@seu.edu.cn

11. Notices.

Any notice to be given under this Agreement should be in writing and addressed to:

Contact Person for Waterloo: Director, Waterloo International

Contact Person for SEU is: Director, Office of Academic Affairs

Notice will be deemed given (i) when verified by written receipt if sent by courier, or when received if sent by mail without verification of receipt or (ii) when verified by automated receipt or electronic logs if sent by facsimile or email. Notices sent by facsimile or email should be followed as soon as possible by original signed documents.

12. Other Terms and Conditions

12.1. **Disruption of Academic Activity.** In the event of a disruption of academic activity at either university, the parties, through their Designated Representatives, will negotiate in good faith in the interest of the Participating Students to enable them to complete the Program.

12.2. **Non-Exclusivity.** This agreement in no way restricts the universities from participating in similar activities or arrangements with others.

12.3. **News Releases.** Any public announcements or news releases resulting from this agreement should be coordinated with Waterloo's Office of Marketing and Strategic Initiatives and SEU's Office of Academic Affairs.

12.4. **Dispute Resolution.** Any disputes in connection with this agreement should be settled by negotiation between the universities through their Designated Representatives.

12.5. **Independent Institutions.** Nothing contained in this agreement should be construed to create or imply a joint venture, partnership, principal-agent or employment relationship between the universities.

12.6. **Governing Law.** This agreement shall be exclusively governed by, and construed in accordance with, the laws of the Province of Ontario, and the federal laws of Canada applicable therein, for exclusive activity in Canada and this agreement shall be exclusively governed by, and construed in accordance with, the laws of the P.R. China for exclusive activity in China.

12.7. **Counterparts.** This agreement may be executed in one or more identical counterparts, each of which shall be deemed an original, but all of which taken together constitute one and the same instrument.

12.8. **Indemnification**. Each Institution shall at all times indemnify and hold harmless the other against all claims, actions, loss or damage arising from the indemnifying party's performance or lack of performance under the Agreement or the acts of commission or omission of its employees, agents or students while carrying out this agreement.

The parties have executed this agreement on the dates shown hereunder.

Dated at Waterloo, Ontario, Canada this day of , 2017

UNIVERSITY OF WATERLOO

per: _____
Dr. Feridun Hamdullahpur, President & Vice-Chancellor

per: _____
Dr. Ian Rowlands Associate Vice-President, International

per: _____
Dr. Jean Andrey, Dean of the Faculty of Environment

Dated at Nanjing, Jiangsu, China this day of , 2017

SOUTHEAST UNIVERSITY

per: _____
Dr. Baosheng Jing, Vice President

per: _____
Dr. Pan Liu, Dean, School of Transportation

Motion: Approve new 2+2 agreement as presented.

Rationale: Agreement has been vetted through Amanda McKenzie Quality Assurance.

Effective: September 2018

To: Senate Undergrad Council, Faculty of Environment
From: Brendon Larson, AD UG
Date: October 17, 2017
Re: New: Knowledge Integration: Science, Technology & Society Specialization

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The Science, Technology, & Society (STS) specialization is designed to cover a broad range of issues, including the nature and organization of knowledge and expertise, science policy, and public understanding of science. It is intended for Knowledge Integration students who want to be exposed to a variety of disciplinary perspectives related to the social, ethical, and political dimensions of science and technology, beyond their core KI courses. The STS specialization consists of seven courses: three from the INTEG core, one STS-themed INTEG elective, and three courses from across campus.

Required courses:

INTEG 120 The Art and Science of Learning
INTEG 220 Nature of Scientific Knowledge
INTEG 221 The Social Nature of Knowledge
One INTEG course with an STS theme from the approved list on the Knowledge Integration website

Elective courses – Students must take three STS-related elective courses, two of which must be 300-level or higher; students cannot take all three from one department (as designated by the subject label). For a list of approved STS-related elective courses, see the approved list on the Knowledge Integration website.

The following is a partial list of the courses that will be maintained on the Knowledge Integration website. Upon request, additional courses may be approved.

INTEG 375: Science and Technology
INTEG 475: Interdisciplinary Collaboration
INTEG 475: Evidence-Based Decision Making
INTEG 475: Open Science and Technology

ANTH 303 Anthropology of Digital Media
ANTH 347 Medical Anthropology
ANTH 430 Anthropology of Science
ERS 265 Water: Environmental History and Change
ERS 372 First Nations and the Environment
ERS 404 Global Environmental Governance
ERS 406 Paths to Sustainability

ERS 422 Biosphere Reserves as Social-Ecological Systems
ERS 454 Parks and Protected Areas: Issues and Trends
ERS 461 Food, Systems, and Sustainability (Cross listed with GEOG 461)
ERS 462 Global Food and Agricultural Politics (Cross listed with GEOG 462)
GEOG 203 Environment and Development in a Global Perspective
GEOG 306 Human Dimensions of Natural Hazards
GEOG 307 Societal Adaptation to Climate Change
GEOG 311 Local Development in a Global Context
GEOG 426 Geographies of Development
GEOG 432 Health, Environment, and Planning (Cross listed with PLAN 432)
HIST 216 A Long History of the Internet
PHIL 208 Philosophy through Science Fiction
PHIL 224 Environmental Ethics
PHIL 226 Ethics and the Life Sciences
PHIL 245 Critical Thinking about Science
PHIL 252 Quantum Mechanics for Everyone
PHIL 256 Introduction to Cognitive Science
PHIL 259 Philosophy of Technology
PHIL 447 Seminar in Cognitive Science
PLAN 333 Neighborhood and Community Planning
PLAN 340 Canadian Environmental Policy and Politics
PLAN 346 Advanced Tools for Planning: Public Participation and Mediation
PLAN 431 Issues in Housing
PLAN 432 Health, Environment, and Planning
PLAN 433 Social Concepts in Planning
PLAN 440 Urban Services Planning
SOC 225 Games and Gamers
SOC 232 Technology and Social Change
SOC 248 Health, Illness, and Society
SOC 312 Sociology of Science
SOC 413 Surveillance and Society
SOC 417 Liberal Arts Education and the Knowledge Society
STV 203 Biotechnology and Society
STV 205 Cybernetics and Society
STV 210 The Computing Society
STV 302 Information Technology and Society
STV 303 Cross-Cultural Change, Technology and Society
STV 401 Society, Technology and Values: Advanced Topics
STV 404 Technology in Canadian Society

Motion: Approve specialization for Knowledge Integration

Rationale: The KI degree requires students to have scientific and technological literacy, as well as knowledge of the social, political, and ethical dimensions of science and technology. Beyond the core STS-related courses, KI offers several STS-themed electives, and several of our students build stronger STS backgrounds by choosing these courses. We would like to create a formal Science, Technology, & Society (STS) Specialization to recognize this academic concentration. Furthermore, having the specialization listed on a graduate's transcript will provide a competitive advantage to help offset the novelty of the Bachelor of Knowledge Integration degree, which is still establishing itself among potential employers.

Note that the STS specialization requires a total of 3.5 course credits, 2.0 of which are not already required for KI students. In addition, students can choose up to three courses (1.5 credits) from another program on campus, which allows flexibility in the STS specialization in line with the overall philosophy of the KI program.

Students will be able to qualify for only one of the two specializations (Collaborative Design Specialization or Science, Technology & Society Specialization) offered to KI students due to double count rules.

Approval has been granted from all departments responsible for administering courses included in the elective list.

Effective: September 2018

To create a new option in Artificial Intelligence, for use by BCS and BMath (CS) students, but not BCS (Data Science) students. The new text is as follows:

Artificial Intelligence Option (Computer Science)
The extent to which Artificial Intelligence (AI) is now ingrained in science/technology development and increasingly central to everyday life is captured in the report and mission of the international One Hundred Year Study on Artificial Intelligence (September 2016). AI advances strive to achieve, to ever-greater degrees of efficacy, reliability and safety, the ways in which machines and systems perceive, see, speak, decide, respond, act and plan. AI questions engage investigators across a range of disciplines—from the computer, statistical and actuarial sciences; to electrical/computer, mechatronics and systems design; to combinatorics and optimization; cognitive science; psychology; biology; applied health science; economics; political science; and law; among others.

The AI Option is available for both the Bachelor of Computer Science (BCS) and the Bachelor of Mathematics (BMath) Computer Science plans. Students in BCS Data Science are not eligible for this option. The requirements are the same as for the BCS and BMath Computer Science (CS) plans with the following constraints on upper-year CS courses:

All of
CS 486 Introduction to Artificial Intelligence
CS 492 The Social Implications of Computing

One of
CS 480 Introduction to Machine Learning
CS 485 Statistical and Computational Foundations of Machine Learning

One of
ECE 380 Analog Control Systems
SE 380 Introduction to Feedback Control

Three additional courses from
CO 367 Nonlinear Optimization
CO 456 Introduction to Game Theory
CO 463 Convex Optimization and Analysis
CO 466 Continuous Optimization

CS 452 Real-time Programming
CS 480 Introduction to Machine Learning
CS 484 Computational Vision
CS 485 Statistical and Computational Foundations of Machine Learning
STAT 341 Computational Statistics and Data Analysis
STAT 440 Computational Inference
STAT 441 Statistical Learning - Classification
STAT 444 Statistical Learning - Function Estimation
ECE 423 Embedded Computer Systems
ECE 481 Digital Control Systems
ECE 486 Robot Dynamics and Control
ECE 488 Multivariate Control Systems
MSCI 446 Data Warehousing and Mining
MTE 544 Autonomous Mobile Robots
SYDE 372 Introduction to Pattern Recognition
SYDE 522 Machine Intelligence
SYDE 556 Simulating Neurobiological Systems
Note: At least one of the "Three additional courses" must be from Math and at least one from Engineering.

Special topics courses (e.g., CS 489) may sometimes be appropriate for this option; interested students should see the option co-ordinator for confirmation.

Practical details (not for calendar):
Enrolment: The option will have an annual cap of 15 students so as not to generate noticeable increase in enrolment in any of the courses listed above.

To facilitate advisement for students interested in this AI option, a listing of equivalent CS/Math prerequisites for all engineering courses in the different lists will be created. Also, a listing of equivalent Engineering prerequisites for all Math/CS courses in the different lists will be created. Some courses will have prerequisites which will need to be overridden by the instructors to allow students enrolled in the

option into the course (as long as no time conflict exists with the core courses schedule). Most of these courses will require minimum level 3A (ECE, SYDE, MSCI, MTE, CS and Math) prerequisites.

Rationale: To allow students to highlight their training in an important part of our field, and to enable students from CS and from Engineering to take courses across the breadth of theory and application of AI.

To change the name of Statistics for Health plan and changing some of the required courses. The new text is as follows:

~~Statistics for Health~~ Biostatistics

Students in this plan must fulfill all the requirements in Table I and Table II. This must include at least ~~24~~ 26 math courses, and the following specific requirements:

One of
MATH 237 Calculus 3 for Honours Mathematics
MATH 247 Calculus 3 (Advanced Level)

All of
ENGL 378/MTHEL 300 Professional Communications in Statistics and Actuarial Science
STAT 330 Mathematical Statistics
STAT 331 Applied Linear Models
STAT 332 Sampling and Experimental Design
STAT 333 Applied Probability
STAT 337 Introduction ~~to Medical Statistics~~ Biostatistics
STAT 431 Generalized Linear Models and their Applications
~~STAT 436 Introduction to the Analysis of Spatial Data in Health Research~~

University of Waterloo
UNIVERSITY COMMITTEE ON STUDENT APPEALS (UCSA)
REPORT TO SENATE
20 November 2017

FOR INFORMATION

In accordance with Policy 72 – Student Discipline, the UCSA is to provide an annual report to Senate on the number of 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 September 2016 to August 2017, as well as the required information for the two 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.

Summary of Student Discipline Cases – Guilty Findings

DISCIPLINE OFFENCE	2014-2015	2015-2016	2016-2017
ACADEMIC			
Academic or admission fraud	1	81	88
Altering of falsifying a relevant document	0	29	19
Cheating	543	512	257
Contravention of statute	3	0	0
Impersonation	9	0	22
Misrepresentation	65	96	92
Obtaining confidential academic materials	0	0	0
Plagiarism	729	853	1441
Theft of intellectual property	22	16	11
Unauthorized aids or assistance	53	47	32
Unauthorized co-operation or collaboration	1179	772	740
Unauthorized resubmission of work	48	41	20
Violation of examination regulations	33	15	11
Other	8	4	12
NON-ACADEMIC			
Contravention of a statute	14	7	3
Disruptive, dangerous, aggressive or threatening behaviour	51	39	16
Infringing unreasonably on the work of others	6	9	8
Mischief	0	2	39
Misuse of University resources	10	8	27
Theft	20	11	0
Unauthorized use of equipment	8	4	3
Unethical behaviour	23	52	74
Other	13	11	13

26 October 2017
/ns

Mario Coniglio
Chair

Vice-President Research - Report for Senate meeting - November 2017

CFI Update

The Unaffiliated Canada Foundation for Innovation – John R. Evans Leaders Fund program is offered three times a year (February, April, and October). The funding is a strategic investment tool that is designed to help institutions to attract and retain the very best of today's and tomorrow's researchers. For the October 2017 competition (due 16-Oct-2017), two proposals were submitted for a total of $103,000 in requested funds.

CRC Update

The Canada Research Chairs Program offers opportunities to nominate outstanding researchers for professorships in areas that will further Waterloo's strategic research plan and maximize their contributions as centres of research and research training. Chairs are available and align with the three federal research granting agencies: CIHR, NSERC and SSHRC. Tier 1 Chairs are for full professors or associate professors who are expected to be promoted to the full professor level within one or two years of the nomination. Tier 2 Chairs are for emerging scholars and should be at the assistant or associate professor level.

On October 23, 2017, four Canada Research Chair Nominations were submitted for a total requested amount of $3,800,000. Two applicants were Tier 1 Nominees (each valued at $1.4M/7 years); one was a new nomination and the other was a second renewal. Two Tier 2 nominations were also submitted (each valued at $500,000/5 years); one was a new nomination and the other was a renewal.

Changes Announced by TIPS (Tri-Agency Institutional Program Secretariat) for the Canada Research Chairs program

The CRC Secretariat has made a number of important changes to their programs, including limiting the number of Tier 1 renewals. The new guidelines allow for a maximum term of 10 years as a Tier 2 CRC, or a maximum term of 14 years as a Tier 1 CRC. In addition, every university must develop an institutional Equity Action Plan (EAP) and post it to a public accountability website (ours is available at https://uwaterloo.ca/research/about-research/canada-research-chair-public-accountability). The primary goal is to ensure an open, fair and equitable recruitment process, by setting equity targets for each of four designated groups but with an underlying focus on research excellence for all Chair appointments. In order to help meet equity and diversity targets, until December 2019 they will allow universities unlimited 'flex moves' to convert chairs across tiers and disciplines. All universities must meet their equity targets by the October 2019 competition.