

University of Waterloo
SENATE EXECUTIVE COMMITTEE
Notice of Meeting

Date: Monday 6 April 2020

Time: 3:30 p.m.

Place: Videoconference

AGENDA	Action
1. Minutes of the 2 March 2020 Meeting	Decision
2. Business Arising from the Minutes	
3. Draft 20 April 2020 Senate Agenda	Decision
4. Other Business	

KJJ/ees
31 March 2020

Karen Jack
University Secretary
Secretary to the Committee

University of Waterloo
SENATE EXECUTIVE COMMITTEE
Minutes of the 2 March 2020 Meeting

Present: Michael Beauchemin, Jeff Casello, Paul Fieguth, Feridun Hamdullahpur (chair), Karen Jack (secretary), Bill Power, James Rush, Naima Samuel, Richard Staines, Bryan Tolson

Regrets: Kofi Campbell, Shannon Dea, Mark Giesbrecht, Robert Gorbet, Vivek Unnithan

1. MINUTES OF THE 3 FEBRUARY 2020 MEETING

Members heard a motion to approve the minutes of the 3 February 2020 meeting.

Tolson and Staines. Carried unanimously.

2. BUSINESS ARISING FROM THE MINUTES

There was no business arising.

3. DRAFT 30 MARCH 2020 SENATE AGENDA

The chair and secretary spoke to revisions which will be made to the agenda: the report from the University Appointment Review Committee will be sent to the April meeting of Senate instead, and a report will be forthcoming from the Honorary Degrees Committee. Members understood that the chair, secretary, and Casello will identify a graduate student presenter.

In discussion: Casello advised that he did not sign the two-year progress report for the engineering undergraduate programs since the report does not cover graduate activities, but “NA” will be added for clarity; notice from Tolson of his intention to raise the response from Renison University College re: teaching load on page 38 of the agenda at the meeting, and a suggestion that another option Tolson might pursue is to raise the matter with David DeVidi and Renison directly; whether the course evaluation report will be brought to the April meeting (yes, intended) and concern whether student representatives will be in attendance; whether there are an unusually high number of sabbaticals in the arts report and observations that the Faculties manage these activities well, that they are planned for, and that they approve them with an eye to striking a balance to meet the Faculty’s teaching responsibilities while ensuring faculty receive their earned leave. Beauchemin advised that he will send the secretary a number of small typos for correction.

Members heard a motion to approve the agenda, subject to the changes as described.

Beauchemin and Tolson. Carried unanimously.

4. OTHER BUSINESS

There was no other business.

7 March 2020

Karen Jack
University Secretary

University of Waterloo
SENATE
Notice of Meeting

Date: Monday 20 April 2020

Time: 3:30 p.m.

Place: Videoconference

	OPEN SESSION	Action
3:30	<p><u>Consent Agenda</u> Motion: To approve or receive for information by consent items 1-5 below.</p> <ol style="list-style-type: none"> 1. Minutes of the 30 March 2020 Meeting* 2. Reports from Committees and Councils <ol style="list-style-type: none"> a. Graduate & Research Council b. Undergraduate Council 3. Report of the President <ol style="list-style-type: none"> a. Recognition and Commendation 4. Report of the Vice-President, Academic & Provost <ol style="list-style-type: none"> a. University Professor Designation 5. Reports from the Faculties 	<p>Decision</p> <p>Information Information</p> <p>Information</p> <p>Information</p> <p>Information</p>
3:35	<p><u>Regular Agenda</u> 6. Business Arising from the Minutes</p>	
3:40	7. Reports from Committees and Councils	Decision
3:50	a. Executive Committee*	Decision
4:00	b. Graduate & Research Council	Information
	c. University Appointments Review Committee	Information
4:10	8. Report of the President	Information
4:20	9. Q&A Period with the President	Information
4:25	10. Report of the Vice-President, Academic & Provost	Information
	a. Course Evaluation Project Update	Information
4:35	11. Report of the Vice-President, Research & International*	Information
4:45	12. Other Business	
4:50	BREAK	
	CONFIDENTIAL SESSION	Action
4:55	13. Minutes of the 30 March 2020 Meeting*	Decision
5:00	14. Business Arising from the Minutes	

CONFIDENTIAL SESSION

Action

5:05

15. Report of the President

Information

5:15

16. Other Business

31 March 2020
*to be distributed

Karen Jack
University Secretary
Secretary to Senate

University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
Report to Senate
20 April 2020

Senate Graduate & Research Council met on 9 March 2020 and agreed to forward the following items to Senate for approval or information as part of the consent agenda.

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

FOR INFORMATION

CURRICULAR SUBMISSIONS

On behalf of Senate, council approved new courses and minor program revisions for the Faculty of Applied Health Science (recreation and leisure) and Faculty of Mathematics (applied mathematics, pure mathematics, master of data science and artificial intelligence).

GRADUATE AWARDS

On behalf of Senate, council approved the Buitrago Opportunity Graduate Scholarship in Engineering (trust), and Mehta-Jenner Climate Change Mitigation Graduate Scholarship (trust).

ACADEMIC PROGRAM REVIEW REPORTS

On behalf of Senate, council approved:

- Two-Year Progress Report – Combinatorics and Optimization (MMath/PhD), as presented at Attachment 1.
- Two-Year Progress Report – Economics (BA/MA) and Applied Economics (PhD), as presented at Attachment 2.

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

Charmaine Dean
Vice President, Research & International

MEMORANDUM

March 22, 2019

The Faculty of Mathematics endorses the Two Year progress report for Combinatorics and Optimization (MMath/PhD) review.

All recommendations have resulted in a change of procedure within the department, and will be implemented on an ongoing basis.

We are happy with the progress that has been made, and the improvements that have resulted as a result of the review.

Yours sincerely,



Stephen M. Watt
Dean, Faculty of Mathematics



Two-Year Progress Report

Combinatorics and Optimization (MMath/PhD)

July 2019; revised February 2020

Background:

The last review of the Combinatorics and Optimization (C&O) MMath and PhD programs was completed in July 2016. The [Final Assessment Report](#) (FAR) was approved by Senate Graduate and Research Council on October 16, 2017. In the report, the reviewers concluded that C&O is a very high quality graduate program and that the Department is very unique in its constitution and attracts strong researchers and students. In addition, the report found that the graduate programs offered by C&O compare well with programs at Georgia Tech, Carnegie Mellon and MIT. The report did point out a few challenges and offered a number of recommendations.

Progress on Implementation Plan:

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 groups promote a more active, focused search.

Action Items: The reviewers recommend that the Department promotes a more active, focused search in areas of need. This is C&O's current policy.

Status: ongoing

Details: As stated in the FAR, faculty recruitment has high priority in C&O. Indeed, C&O has in the past been very successful in attracting top candidates. The international competition for top candidates is very strong, and C&O circumnavigates this by advertising broadly. As we pointed out, certain Department members will be asked to help attract applicants in target areas. We recently implemented this strategy successfully: at the time of the report, C&O had openings in Continuous Optimization and in Cryptography. These two areas are notoriously difficult to hire in as demand for graduates here is exceptionally high in industry and in academia. With the help of colleagues in the respective areas we successfully targeted applicants in these two areas and hired two new colleagues in the 2017/18 hiring round. We expect to pursue such targeted hiring strategies in the future.

- 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.

Action Items: Contact faculty members that left the Department since 2006 and inquire for reasons. In the future determine reasons for leaving prior to the event.

Status: **ongoing**

Details: As the FAR states, faculty members that left C&O since 2006 were contacted, and responses were received. In summary, most faculty members left because they received prestigious positions in their home countries, or they left because of family reasons. Since 2017, only one faculty member left the Department. The Chair interviewed the faculty member prior to his leaving. It was determined that the colleague was leaving because of family reasons. In the future, the Chair will continue to interview colleagues that leave the Department prior to the event.

- 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.

Action Items: no concrete recommendation was made. The Department will continue to encourage applications from women and minority candidates by advertising in appropriate venues, and by supporting local initiatives enhancing gender balance. The Department will also continue its efforts to encourage female and minority students to join its graduate programs.

Status: **ongoing**

Details: The Department will continue to advertise positions broadly, encouraging applications from women and minority candidates. In our last hiring round, we hired 5 new faculty members, 3 of which are women. One of these female hires is an “exceptional hire”, where, through substantial effort, we succeeded attracting a much lauded female star in combinatorics to our Department. About a third of the graduate students in C&O are women. The Department will continue to work to improve gender balance among its graduate students and faculty members in the future.

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.

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

Status: **ongoing**

Details: The Department continues to fly in potential graduate students from the US every year, and will continue to do so. Skype interviews with students, especially from countries outside the USA are also arranged. C&O continues to make offers to students (especially those of exceptional quality) as quickly as possible. C&O continues to encourage faculty to recruit strong students through contact at conferences and workshops. C&O faculty members are active in organizing international workshops and Summer schools, thereby increasing the Department's visibility to potential students.

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 Principal Investigator (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.

Action items: No recommendation to the Department was made

Status: **ongoing**

Details: Graduate student funding for domestic students was raised from \$26,000 to \$27,000 and for international students from \$38,000 to \$41,000. Funding levels will be reviewed annually.

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

Action items: 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.

Status: **ongoing**

Details: Students are now actively organizing meetings to discuss concerns among themselves. Students have elected a representative who is now always attending Department meetings. Students have brought forward a number of suggestions in the past two years that were discussed and acted upon by the Department's Graduate Affairs Committee. The meetings of the Graduate Affairs Committee has also on occasion been attended by the graduate student representative for detailed discussions.

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

Action items: 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.

Status: **ongoing**

Details: students continue to submit special requests and petitions for plan adaptations to the graduate affairs committee. If adequate reasons are submitted, these requests are usually approved. The graduate chair reviews rights and options with incoming students in his/her first meetings with them.

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

Action items: Introduce meetings as suggested.

Status: **ongoing**

Details: The Department continues to organize a graduate student orientation in the Fall term. The Graduate Chair meets with incoming graduate students at the beginning of their first term in Waterloo. It is planned to have the Graduate Chair also meet with incoming students during the second and third terms of their first year.

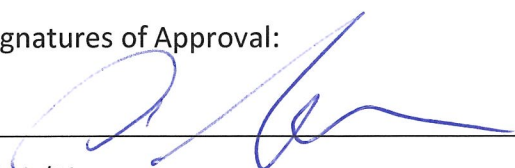
Updated Implementation Plan

	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing Recommendations
1.	Faculty recruitment	Continue focused search in areas of need.	Chair	Ongoing
2.	Faculty retention	Continue to interview faculty members who leave the Department.	Chair	Ongoing
3.	Gender balance	Continue to work towards gender balance among faculty and students.	Chair	Ongoing
4.	Graduate student recruitment	Continue to fly in prospective graduate students from the US.	Chair, Graduate Chair	Ongoing
5.	Graduate student funding	Funding to be review annually.	Chair	Complete and to be reviewed annually.
6.	Communication	Continue to engage graduate students in department-wide discussions on policy and procedures.	Chair, Graduate Chair	Ongoing
7.	Flexibility	Continue to inform student of their rights and options.	Chair, Graduate Chair	Ongoing
8.	Masters advising	Continue to have one-on-one meetings with graduate students, especially in their first year on campus.	Graduate Chair	Ongoing

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

Date of next program review: _____ 2022-2023
Date

Signatures of Approval:



Chair/Director Date 2019-4-3

AFIW Administrative Dean/Head (For AFIW programs only)

Date

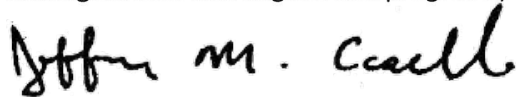


Faculty Dean Date 2019-04-03

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

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

Date



August 7, 2019

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

Date

Checklist for SUC/SGRC Reviewer Feedback Quality Assurance Office

Two-Year Progress Report: Combinatorics and Optimization (MMath/PhD)

Name of Reviewer: Julie Joza

Date: 2/20/2020

Does the Two-Year Progress Report:

- | | | |
|--|--|------------------------------------|
| 1. Clearly describe progress achieved on the various action items in the implementation plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. Explain convincingly any circumstances that would have altered the original implementation plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. For items that are behind schedule, propose an amended implementation schedule that is reasonable and credible? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Address significant developments or initiatives that have arisen since the program review process, or that were not contemplated by the program review process? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

General Comments

I did not answer # 3 and # 4 as they did not appear to be applicable in this situation.



Two-Year Progress Report

Economics (BA/MA), Applied Economics (PhD)

July 2019; revised February 2020

Background

The Department of Economics submitted a self-study report to the Associate Vice-President, Academic and the Associate Provost, Graduate Studies (now the Associate Vice-President, Graduate Studies and Postdoctoral Affairs) on August 4, 2015. In December of 2015 two arm's length external reviewers, Prof. Hugh Neary (Vancouver School of Economics) and Prof. Samuel Bucovetsky (York University), visited the Department for two days to review the quality of the BA, MA, and PhD programs. The external reviewers issued a written report in March of 2016. In September 2016 the Final Assessment Report (FAR) was issued summarizing the self-study Report, the external reviewers' recommendations, and the Department's responses to the recommendations.

This Two-Year Progress Report is a required part of the University's cyclical program review process. The report outlines what progress has been achieved to date with the implementation of recommendations from the last program review.

Progress on Implementation Plan

Below we describe each of the recommendations of the external reviews which resulted in action items listed in the Implementation Plan in the Final Assessment Report.

Recommendations

Recommendation 1: Carefully monitor the consequences of the undergraduate curriculum reform.

Background: As described in the self-study Report, a reformed undergraduate curriculum had come into effect in the fall of 2016.

Proposed actions from the FAR: The Undergraduate Associate Chair will carefully watch trends in undergraduate enrollments and majors and suggest changes to the program to be considered by the Undergraduate Committee.

Timeline from the FAR: Monitoring to be done each term.

Status: in progress

Details: Monitoring is happening each term with reports made to the Undergraduate Committee and at Department meetings. Enrollment trends in each course are being tracked as well as failure and withdrawal rates. Thus far, we have observed no trends that would indicate further curriculum changes or other actions are warranted.

Recommendation 2: Carefully monitor work demands on staff and resources.

Background: The external reviewers had noted that staff workloads had increased due to some new responsibilities (in particular the Management Studies minor and the administrative duties due to the Director of the Water Institute), changes to university procedures (e.g. course scheduling), and extra advising required with the transition to the reformed undergraduate curriculum.

Proposed actions in the FAR: The Department Chair continues to check in at monthly staff meetings and deals with problems as they arise.

Timeline from the FAR: Monthly

Status: in progress

Details: The Chair and Associate Chairs meet regularly with staff. In addition, we are in conversations with the Arts Executive Officer and Human Resources to ensure the grading of our staff positions is appropriate for the work load.

In February/March of 2018, our Administrative Assistant put in a request to Human Resources to upgrade our Support Services Coordinator from a Level 4 to a Level 5. Human Resources approved this change.

The Dean of Arts Office has taken the lead in requesting that our Administrative Assistant position be upgraded from a Level 7 to a Level 8. This request has been denied, although the title of the position will be changed to Administrative Manager.

We have devoted additional faculty resources to undergraduate advising in order to allow the Undergraduate Administrator and Advisor not to do advising in peak load periods of administrative demands. As well, the undergraduate curriculum transition is complete and there now is only one set of academic plans, which does reduce advising complexity and demands. We continue to monitor the demands of the position.

With respect to the significant administrative overhead demands from the Water Institute as well other researchers with multiple grants we will continue to monitor the situation and will argue for additional resources from the Dean's Office if appropriate.

Recommendation 3: Conduct an ad hoc review of the questions raised about the graduate programs – in particular, the balance between theory and application.

Background: The Department recognizes the need to provide students with a strong foundation in economic theory and mathematical and statistical tools as well as the importance of giving students the chance to apply this knowledge to practical economics problems. The right balance between these different objectives is a topic of ongoing discussion.

Proposed actions in the FAR: Department Chair and Graduate Associate Chair to lead discussions at Departmental Retreat in August 2016 and subsequent Graduate Committee Meetings in 2016 – 2017.

Timeline from the FAR: If changes were deemed desirable, it was proposed we would begin the process in 2018.

Status: incomplete

Details: Departmental discussions on these issues took place at the department retreat in August 2016 and at subsequent Graduate Committee meetings. Some Department members have expressed the opinion that the graduate curriculum should be revisited and possibly reformed. In the next two years, it is planned that a task force will be appointed to undertake the lengthy steps needed for any curriculum reform. Over the past few years, there have been a number of Graduate Associate Chair changes due to admin appointments, sabbaticals and paternity leaves. In September 2019, a new Associate Graduate Chair was appointed with the express mandate to get this item completed. A subcommittee is currently very active. It has outlined the learning objectives of the graduate programs and is in the process of defining the plan structures that would best support them.

Recommendation 4: Monitor the success of formal tutorials scheduled for the first time for Fall 2016 in [ECON 211](#), [ECON 221](#), and [ECON 322](#).

Background: These tutorials were part of the reformed undergraduate curriculum and were intended to assist students in foundational courses that many students find difficult.

Proposed actions in the FAR: Undergraduate Associate Chair will review success at the end of every term with respect to student feedback and student success.

Timeline from the FAR: Review will be conducted every term.

Status: in progress

Details: This review continues mainly through checking in with instructors who have conducted ad hoc surveys to gather student feedback, as well as reviewing student success in terms of grades. Overall, these tutorials are considered to have been very successful. Instructors are happy with the effect on student comprehension of course material. Especially for the econometrics sequence (Econ 221-322-323) we have seen improved ability (especially in coding) in follow-up courses. We have added mandatory tutorials to an additional course – [ECON 323](#) (Econometric Analysis 2) for that reason. Grade distributions appear not to have been significantly affected. However, the course content changed at the same time, so a direct comparison is not informative.

ECON 211 remains somewhat of a stumbling block, in the sense that some students find it hard to achieve the required grades to enter or remain in the major. The introduction of tutorials has helped some students, based on their feedback. Fine-tuning the ECON 211 material is an ongoing project.

Recommendation 5: Pursue closer ties with current 2+2 partnerships and expand to additional universities.

Background: Our 2+2 [partnerships](#) have resulted in high quality students graduating from our program and have generated international tuition for the Faculty of Arts.

Proposed actions in the FAR: Maintain regular communication with partner universities, visiting once a year as budget allows. Push through additional agreements that have been started. This would be led by the Chair of our International Programs Committee.

Timeline from the FAR: A trip to China to visit partner universities was planned for Fall 2016. Additional 2+2 agreements should be in place by early 2017. **Update:** Economics anticipated traveling in 2016 to China with a delegation from Science. This trip was cancelled. However, two of our faculty members have visited China on their own in the past year, and have visited some of our partners.

Status: In progress

Details: Agreements with five new partner institutions were signed in September 2017 for new or renewed 2+2 programs. We are continuing the practice of having faculty members visit with partner institutions, if possible, when they are in China for other reasons, such as to attend conferences. For example, in June 2018 Prof. Dinghai Xu visited with East China University of Science and Technology and made a presentation to prospective 2+2 students.

We also recently signed an Admissions Pathway Agreement with a new partner, the Shanghai University of Finance and Economics (SUFE). Students in this program will do a preparatory year at SUFE prior to application for admission to the Economics MA program at Waterloo.

Recommendation 6: Consider developing international partnerships with institutions outside of China.

Background: This is considered an opportunity for attracting additional high quality students.

Proposed actions in the FAR: Chair of the International Programs Committee will ask Waterloo International to keep us aware of potential new international partners.

Timeline from the FAR: A long-term goal to be reviewed in Fall 2018.

Status: Incomplete

Details: We have not devoted any attention to attracting international partners from outside of China. However, the Dean of Arts attended a student recruiting event in India in 2018 and Arts has had an increase in applications by students from India. Economics may be able to build on these developing relationships in the future.

Recommendation 7: Work with alumni network through Arts Advancement to look for additional sources of funds for lecture series.

Background: A regular department seminar series is a very important element in highly ranked economics departments. Arts has a significant budget deficit, so it is important for Advancement to work with Economics to raise funds to support our seminar series as well as our annual Distinguished Lecture.

Proposed actions in the FAR: Continue to seek ways to engage alumni. Plan special events for alumni and students as resources permit. This could be spearheaded by the Chair of the Alumni and Student Relations Committee

Timeline from the FAR: Review success in summer 2018

Status: In progress

Details: Arts Advancement has assisted us in raising some funds to support our Distinguished Lecture Series and we are assured of adequate funds until Fall 2019. We

continue to look for other ways to engage with our alumni. In 2018 we held our [second biennial PhD student conference](#), which invites our undergraduate and graduate alumni who are enrolled in PhD programs elsewhere, as well as our own PhD students, to present their research at a day-long conference. This event helps us maintain connections with alumni on an academic career path, and helps those alumni and our PhD students to network. The conference was well received by participants.

Recommendation 8: Assist PhD students to find a thesis supervisor more quickly.

Background: In Economics, PhD students do not normally choose a supervisor until their second year but some students were delaying beyond the second year.

Proposed actions in the FAR: Implementation of the new requirement that PhD students complete a second-year research paper under the supervision of a faculty member.

Timeline from the FAR: Change has been implemented. Review success in summer 2017.

Status: Completed

Details: The second-year paper has been a successful means of getting students connected with supervisors and helping students make the transition to independent research.

Recommendation 9: Address concerns of MA students that they are not adequately prepared for co-op interviews in January.

Background: This is a challenge for the Department as in the fall term the students need to take courses to acquire key skills and knowledge in econometrics and economic theory. This leaves less time for applied, policy related courses. However, students do take one elective in the fall term.

Proposed actions in the FAR: Offer more applied, policy oriented courses in the fall. Provide the opportunity to participate in mock job interviews.

Timeline from the FAR: Change has been implemented for fall 2016. Review success in spring 2017.

Status: Completed

Details: The required course Research Methodology ([ECON 606](#)) is now offered in the fall term. One focus of the course is to prepare students with skills they need to work as

a professional economist. We are also mindful of choosing elective courses for the fall term that will support student success in job interviews. We are continuing the practice of doing mock interviews for the students. These are in addition to any interview coaching provided by the Co-operative Education.

Explain any circumstances that have altered the original implementation plan

Nothing additional to add beyond what is discussed above.

Address any significant developments or initiatives that have arisen since the program review process, or that were not contemplated during the review

None

Updated Implementation Plan				
	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing Recommendations
1.	Continue to carefully monitor the consequences of the undergraduate curriculum reform.	Watch trends in undergraduate enrollments and majors, make changes as needed	Undergraduate Associate Chair	Reporting at the end of each term – this reporting will continue indefinitely (ongoing)
2.	Continue to carefully monitor work demands on staff resources	Check in at monthly staff meetings. Deal with problems as they arise. Work with Human Resources and the Arts Executive Officer to ensure staff jobs are graded correctly.	Department Chair	Monthly basis – this has become an ongoing practice (ongoing)
3.	Conduct an ad hoc review of the questions raised about our graduate programs – in particular, the balance between theory and application.	Discussions to happen at the Graduate Committee with possible appointment of a Task Force to propose curriculum reforms.	Department Chair and Graduate Associate Chair	The process will begin in Fall 2019 when a new Graduate Associate Chair takes over.
4	Monitor the success of formal tutorials scheduled for the first time for Fall 2016 in ECON 211, ECON 221, and ECON 322.	Review success at the end of every term with respect to student feedback and student success.	Undergraduate Associate Chair	We will review on an annual basis. The tutorials have been deemed a success overall. (complete and ongoing)

5.	Strengthen ties with current 2+2 partnerships. No additional partnerships are being sought at this time.	Maintain regular communication with partner universities, visiting once a year as budget allows.	Chair of International Programs Committee	Ongoing
6.	Consider developing international partnerships with institutions outside of China.	Ask Waterloo International to keep us aware of potential new international partners.	Chair of International Programs Committee	Ongoing
7.	Work with our alumni network through Arts Advancement to look for additional sources of funds for our lecture series.	Continue to seek ways to engage alumni. Plan special events for alumni and students as resources permit.	Chair of the Alumni and Student Relations Committee	Ongoing
8.	Assist PhD students to find a thesis supervisor more quickly.	Maintain the requirement that PhD students complete a second-year research paper under the supervision of a faculty member.	Graduate Associate Chair	Complete
9.	Address concerns of MA students that they are not adequately prepared for co-op interviews in January.	Continue to offer more policy-oriented courses in the fall term and support co-op students with mock interviews.	Graduate Associate Chair	Ongoing

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

Report on anything else you believe is appropriate to bring to Senate concerning this program: Nothing to add.

Date of next program review: _____ 2022 _____
Date

Signatures of Approval:

Margaret Insley _____ July 24, 2018
Chair/Director Date

AFIW Administrative Dean/Head (For AFIW programs only) Date
[Signature] _____ 26/jii/18
Faculty Dean Date

[Signature] _____
December 1, 2018

Associate Vice-President, Academic Date
(For undergraduate and augmented programs)
[Signature] _____
December 10, 2018

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

Checklist for SUC/SGRC Reviewer Feedback Quality Assurance Office

Two-Year Progress Report: Economics (BA/MA), Applied Economics (PhD)

Name of Reviewer: Anita Layton

Date: 2/24/2020

Does the Two-Year Progress Report:

- | | | |
|--|---|-----------------------------|
| 1. Clearly describe progress achieved on the various action items in the implementation plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. Explain convincingly any circumstances that would have altered the original implementation plan? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. For items that are behind schedule, propose an amended implementation schedule that is reasonable and credible? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Address significant developments or initiatives that have arisen since the program review process, or that were not contemplated by the program review process? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |

General Comments

The two-year report adequately addresses actions taken to (1) consequences of the undergraduate curriculum reform, (2) monitor work demands on staff and resources, (3) review issues concerning the graduate program, (4) monitor the success of formal tutorials, (5) expand 2+2 partnerships, (6) developing international partnerships, (7) work with alumni network, (8) assist PhD students to identify a supervisor, and (9) prepare MA students for co-op interviews.

The revision has adequately addressed the questions I raised.

University of Waterloo
SENATE UNDERGRADUATE COUNCIL
Report to Senate
20 April 2020

Senate Undergraduate Council met on 10 March 2020 and agreed to forward the following items to Senate. Council recommends that these items be included for information or approval, as noted, in the consent agenda.

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

FOR INFORMATION

ACADEMIC PROGRAM REVIEWS

Two-Year Progress Report – Science and Aviation, Geography and Aviation. Following discussion regarding accreditation, resources and growth, Council approved the two-year progress report on behalf of Senate. See Attachment #1.

UNDERGRADUATE SCHOLARSHIPS, AWARDS AND BURSARIES

This report is presented for information. See Attachment #2.

MINOR PLAN & CURRICULAR MODIFICATIONS

Council approved the following on behalf of Senate:

- minor plan changes for the faculties of mathematics (actuarial science, actuarial science/finance specialization, actuarial science joint, mathematics/business administration, information technology management, mathematics/financial analysis and risk management, mathematics/CPA – finance specialization, mathematical finance, math/teaching); science (physics, astrophysics minor).
- new courses for the faculties of mathematics (mathematics/business administration); science (physics).
- course changes for the faculties of mathematics (applied mathematics, mathematics electives, statistics and actuarial science); science (physics).
- course inactivations for the faculties of mathematics (statistics and actuarial science); science (physics).

/rmw

David DeVidi
Associate Vice-President, Academic



Two-Year Progress Report

Science and Aviation (BSc), Geography and Aviation (BES)

June 2019; revised January 2020

Background

In accordance with the University of Waterloo's Institutional Quality Assurance Process (IQAP), an external review of the aviation programs (Science and Aviation, Geography and Aviation) was conducted November 6-7, 2014. The resulting report from the examiners was returned on November 20, 2014. A written response to the reviewers' recommendations was submitted to the University on June 18th, 2015, by the Director, Ian McKenzie and received endorsements from the Dean of Environment on June 19, 2015 and the Dean of Science September 5, 2015. This was the first review conducted for the aviation programs.

This report presents progress updates on the recommendations made by the reviewers. Each recommendation/comment (*italicized*, 2014) is followed by the initial response (2015) and an updated progress update (2018). This information is summarized within the implementation table, attached to the end of this document.

Responses to the Reviewers' Recommendations

1. Reviewer Comments: *Is the degree nomenclature appropriate? The degree name could be misleading. "Bachelor of Science and Aviation" or "Bachelor of Geography and Aviation" could lead a recruiter to the mistaken opinion that the graduate has more theoretical background in Aviation. In fact, the graduates have no more background in Aviation than a graduate of an airport-based flight school. Something like "Bachelor of Science (Professional Pilot)" may be more appropriate unless the academic curriculum is enhanced with core aviation courses.*

Initial Response: We disagree. The degree names stated by the reviewer are incorrect. The actual name of the degrees are Bachelor of Science (Science and Aviation) and Bachelor of Environmental Studies (Geography and Aviation). We believe that the current degree nomenclature is appropriate for distinguishing Aviation as a separate/individual degree program at Waterloo. It is in line with the intention of identifying Aviation as an academic discipline in its own right, rather than solely as an add-on/option to existing traditional degree programs. This also encourages more growth, expansion, and resources.

Progress Update: No further actions taken regarding the degree name. In response to reviewer comment 'unless the academic curriculum is enhanced with core aviation courses', additional AVIA courses have been added to expand the scope of academic aviation offerings (more details in response #4).



2. Reviewer Comments: *Car Share or Bus Service - Transportation and parking seem to be a major ongoing problem for flight students. It was recognized that both the Director of Aviation and the General Manager of [Waterloo Wellington Flight Centre \(WWFC\)](#) have invested time and energy into finding a resolution.*

Initial Response: The reviewers are correct that since the program began, we have conducted an extensive search for transportation options. Students have developed creative ways to manage their transportation needs such as carpooling with students with flights at the same time; sharing rides with other students across various years; and, most recently, using the Student Care Share program. Recently the Airport, leading to an additional expense, has enforced parking fees.

Progress Update: All Waterloo Undergraduates have Grand River Transit passes. Currently a bus comes within 4 km of airport and some students will use a bicycle to cover the rest or if a few are travelling together for a flight, take an Uber from the nearest stop. We anticipate that with operation of the ION, residential growth in Breslau, and the new Grand River Bridge crossing on Fairway Road to Fountain St., new bus routes will cover the airport. Currently many students with similar academic schedules are sharing rides and book flights at similar times with their various instructors. We will continue to advocate for public transportation to access the Airport, not just for aviation flight training but for all students, who might want to travel from the Region of Waterloo International Airport.

Work plan: The most practical solution for students without a car is public transportation because they can obtain student-rate bus passes. We anticipate that transportation options to the airport will improve with the operation of the ION in 2019

Responsibility: The Director in conjunction with AVIA Faculty members and WWFC.

January 2020 Update: Breslau area continues to grow and a bus link is expected within the next year as routes are adjusted with the arrival of the ION. Students continue to find transportation to the airport through ride sharing networks with other students. Discussions are ongoing with the Region to deliver bus service to the Region of Waterloo International Airport.

3. Reviewer Comments: *Internship Opportunities - The program is encouraged to continue identifying relationships with industry and leveraging the co-op and internship resources on the University of Waterloo campus for 3rd and/or 4th year aviation students.*

Initial Response: We agree. There are no traditional co-op opportunities in aviation because flight training occurs in all terms until 4th year. An opportunity for experiential learning in the spirit of Waterloo is welcomed. We continue to investigate 3 to 6 week opportunities for paid internships with airlines, flight operations, and aviation related companies. We envisage this as a 4th year elective course for students.

Progress Update: After exploring this possibility, we decided the impact would be limited as most flight students choose to pursue additional flying during this phase. Instead, we chose to focus on incorporating enhanced industry cooperation within their academic coursework. This includes working with the Co-operative and Experiential Education (CEE) to improve aviation job-readiness skills (4 CEE sessions by a career advisor, are now embedded within academic courses throughout their degree plans). In addition, experiential learning assignments where students collaborate with industry partners provide opportunities for real-world problem solving and industry networking, have



been incorporated within AVIA 100, 310, 315, and 320. Since the review, several direct job pathway programs have been established (with Sunwing, Jazz, and Porter Airlines) which allow our graduates an expedited pathway to an airline pilot position.

Work plan: Continue to enhance experiential learning opportunities for aviation students. In the Fall of 2018, AVIA 310 will incorporate an assignment using the [Riipen](#) platform. Airline industry partners will submit assignments, collaborate with students, rate performance, and invite the highest-scoring group to a dinner with airline executives. Following an assessment of Riipen within AVIA 310 an assessment will determine whether this software will be incorporated in other AVIA courses.

Responsibility: The Director in conjunction with AVIA Faculty members.

4. Reviewer Comments: *Creating 2 new 0.5 courses on aviation topics (1.0 credits). Suggestions include: A 1st year class to introduce students to aviation - a survey course exploring aspects of the 'aviation core' topics suggested by Aviation Accreditation Board International (AABI). A 4th year course run by a course manager but with lectures presented by different professors each week from across Waterloo campus (whose work relate to aviation such as robotics, systems design engineering, computer science, etc.).*

Initial Response: We agree. Adding more aviation focused academic courses to the plan would be popular with students; however, more staffing resources are required.

Progress Update: Since the report, [AVIA 310](#) has been completely redeveloped and three new aviation academic courses have been added to the curriculum ([AVIA 100](#), [AVIA 315](#) and [AVIA 320](#)). [AVIA 320 \(formerly AVIA 374\)](#) on Unmanned Aerial Systems has been taught three times.

Work plan: Monitor student evaluations of new course offerings, and liaise with aviation industry colleagues to ensure course content is aligned with professional competencies.

Responsibility: The Director in conjunction with AVIA Faculty members.

January 2020 Update: Effective Sept. 2020 a new specialization begins in the Geography and Environmental Management (GEM) Plan. The Aviation Specialization (5.5 units) is focused on growing Waterloo's presence in the aviation industry with career opportunities such as airline dispatch, air traffic control support, airport management and planning, tourism and sustainable aviation. The Aviation Specialization is supported by a suite of courses from AVIA, GEOG and cross lists with PLAN. The Aviation Specialization joins GEM's existing specializations in: Climate Change and Environment, Earth Systems Science, Economy and Society and Geomatics.

5. Reviewer Comments: *Add a significant culminating upper year experience in aviation. For example, a capstone course, internship, or special project related to aviation that is a required part of the degree.*

Initial Response: We are considering this suggestion. The opportunity for an internship is being considered for 2017 as an elective. A special research project course is already available ([AVIA 475: Independent Studies of Selected Topics](#)). Flexibility is required in year 4 to meet various degree requirements. A capstone course for all Aviation students in Science and Geography would be difficult to add into the program. Students are working to complete academic specializations or minors in year



four. These credentials, among others, can include Physics, Earth Sciences, Biology, Chemistry and Geomatics.

Progress Update: A new upper-year aviation course ([AVIA 320](#)) was added to the curriculum in the winter of 2018. [AVIA 320](#) incorporates a 'safety challenge' which is completed by students throughout the semester. Student solutions, which require references to elements learned in earlier years of the program, are presented to a panel of industry judges at the end of the term.

Work plan: Explore methods to enhance a senior culminating experience. The Riipen platform that facilitates experiential learning and industry partners will be explored for this purpose beginning in the winter of 2019. Continue to develop the aviation plans to include industry experience for aviation students.

Responsibility: Director of Aviation & Instructor of [AVIA 320](#)

January 2020 Update: In Sept 2020, GEOG/AVIA 416, Sustainable Aviation 1.0 unit elective will be considered a capstone course. Currently GEOG 490 A, B (1.5 units) are available to students to do research.

As part of the new Integrated Aviation Flight Program, approved by Transport Canada, students graduating in 2021 will have completed four years of integrated flight training experience. This culminates in year 4, with multi-crew resource and simulator training to manage a multi crew environment. The writing of 2 pre-graduation professional exams, the SAMRA and SARON, gives students credit towards the Airline Transport Pilot Licence (ATPL). The ATPL (frozen) allows graduates to get their ATP Licence when they have completed 1,500 flight hours.

6. Reviewer Comments: *We also recommend incorporating some mandatory flight training in 4th year to avoid flight skills becoming 'rusty' during that time (not necessarily more flight hours, but a redistribution of training so that it extends into 4th year).*

Initial Response: We understand this suggestion; however, raise the following points. Some students already obtain flight training in fourth year because they complete extra credentials in aviation (e.g. 30% of students pursue an Instructor Rating or Float Rating). The Waterloo Aviation program already has flight training in 8 terms (1B to 3C; including 3 spring terms). Students on campus during a spring term may work part time (80% of year 3 students), or take extra courses in order to graduate early or reduce their load in other terms (20% of year 3, 40% of year 2, and 30% of year 1 students). We have already discussed the incorporation of the new two-person crew ALSIM flight simulator as an additional training option.

Progress Update: The aviation industry has evolved significantly since the time of the original report and our program has adapted. Fourth year students now have the option of seeking employment through one of our airline partnership programs (Sunwing, Jazz, or Porter Airlines). WWFC has responded and been approved by Transport Canada to initiate a new training program, including multi crew coordination training, to help students gain the skills they require to fly large, complex aircraft. The [Integrated Airline Transport Pilot](#) program, leading to the 'Airline Transport Pilot Licence (ATPL) frozen', prepares our students to write the Transport Canada ATPL professional exams while still in school. These exams are typically completed after graduates have accumulated 750 total flight hours



and several years of experience (our program is 205 hours). The additional training is optional (as it does carry additional costs). Before a pilot can be a Captain of a multi-crew flight, the pilot in command must hold an ATPL. This gives our program an advantage over other flight training programs in Ontario. Students entering our program in 2017 are on the pathway to take this flight training option in 4A. The University of Waterloo Aviation Programs and Seneca College, School of Aviation are the only two Ontario, Post- Secondary institutions with the ATPL integrated programs.

Work plan: Beginning in the fall of 2017, incoming first year students have the option of choosing a different pathway for their flight education. This pathway would lead them to earn an Integrated Airline Transport Pilot Licence (ATPL), which would support their progression more directly into an airline pilot position. This is an optional pathway but is an indication that flight training within the program is evolving to meet industry needs.

Responsibility: Director of Aviation & WWFC

7. Reviewer Comments: *Incorporate crew-coordination training into flight curriculum. Not necessarily additional hours of training, but a restructuring of a few existing flight lessons to target crew-coordination skills through Line-Oriented Flight Training (LOFT) and/or scenario-based simulator flights.*

Initial Response: We agree. This idea is already being considered with WWFC, using the new ALSIM simulator in year 4. This is further discussed under item 16 below (the writing portion of the Airline Transport Pilot Licence).

Progress Update: Please see progress update for response to item #6.

8. Reviewer Comments: *Incorporate more student involvement in flight training. Consider training students in elementary maintenance. Involve students in regular safety meetings.*

Initial Response: We believe there is limited potential for this suggestion. Basic maintenance information is possible, but WWFC considers that, only the Aircraft Maintenance Engineer has responsibility to work on any aircraft.

WWFC has an active Safety Management Systems (SMS) and a flight officer responsible for WWFC activities. SMS help companies identify safety risks before they become bigger problems. Transport Canada regulations require the aviation industry to put safety management systems in place as an extra layer of protection to help save lives.

Progress Update: Students are encouraged to participate in the safety management process at WWFC, through submitting safety reports and safety meetings. Through the new course [AVIA 320](#) 'Aviation Safety' students are educated on the process and limitations of safety management systems (SMSs), enhancing their ability to engage with the WWFC safety program as well as that of future employers.

Work plan: Continuing with current student involvement in safety program.

Responsibility: WWFC and Director of Aviation



9. Reviewer Comments: *Explore a specialization in Unmanned Aerial Vehicles/Systems (UAVs/UASs). With the aviation program located within Geography and Science it seems logical for aviation program to explore opportunities within the UAV/UAS sector. This is a segment of the aviation industry that is growing rapidly yet there is little academic guidance to support best practice. With an academic specialization in UAV/UASs Waterloo graduates would be likely to have a more direct link between the academic courses they complete at the University and how that knowledge can help them contribute to industry (and find employment).*

Initial Response: We agree and have been exploring the UAV/UAS opportunity. As indicated in item #4 above, we will offer a new UAS course as [AVIA 374](#) in Winter 2016. The WWFC has launched a [new flight course in UAV](#). We are reviewing training courses (in Canada and in the USA).

Progress Update: [AVIA 270 / GEOG 270 \(formerly GEOG 374\)](#) a special topics course exploring the use of drones, is now running annually and attracts both Aviation students and those from other programs.

Work plan: We have developed an RPAS (Remotely Piloted Aircraft System, aka “Drone”) option, which would be available to students not currently enrolled in an aviation program. This option is under review and may be re-introduced as a non flight option. Program growth and flight training demand on WWFC facilities does not permit a separate Private Pilot Licence for this option.

Responsibility: Director of Aviation & AVIA, GEM and Geomatics faculty members

10. Reviewer Comments: *Collaboration with Western and Windsor University’s aviation program. With a similar structure and the close geographic proximity, it seems logical for Waterloo, Western, and Windsor to collaborate. Possibilities include notifying each other of guest speakers, tours, shared student chapters (99’s, Women in Aviation, IAAE, etc.), student social events (such as ski trips), etc. Also, sharing faculty resources by allowing Waterloo students to complete other University aviation courses and vice versa is an opportunity worth exploring.*

Initial Response: We agree but as a lower priority goal. Collaboration between university programs would be appropriate, especially Western because of its proximity. Opportunities could include invitations to lectures with guest speakers and collaborative research opportunities related to the aviation industry. Social events can be organized by students such as ‘fly-ins’. Meetings could be arranged at the home airport of one institution, with student pilots from the other flight programs, arriving by plane.

It should be noted that students already can take courses elsewhere on a Letter of Permission. Developing additional Waterloo AVIA courses with Waterloo faculty will be a higher priority than arranging inter-institutional collaborations.

Progress Update: Conestoga College and Western’s aviation students have been invited to campus annually, to attend Chris Hadfield’s guest lecture. To support our outreach to the international aviation community, Waterloo’s aviation program has partnered with the [International Civil Aviation Organization \(ICAO\)](#) to launch a free online course called ‘[Fundamentals of the Air Transport System](#)’ (FATS). This course provides accessible, online learning to an international audience. Launched in Dec. 2017, more than 2000 people have taken this course from every global region. Dr. Suzanne Kearns’



text book 'Fundamentals of International Aviation', 2018 has recently been translated into Turkish and ICAO is negotiating with the publisher for translation rights in other languages.

Another annual event, hosted and co-ordinated by the Aviation Society is a [Career Day](#). Conestoga College Aviation students are also invited. This year industry representatives include: Porter Airline, Jazz Aviation, Sunwing, Great Lakes Helicopter, Air Canada- Rouge, WestJet Encore, Chartright Air, WestJet and Air Canada.

Work plan: We remain open to collaborative opportunities. We will monitor and report on the impacts of the FATS course annually.

Responsibility: Director of Aviation

11. Reviewer Comments: *Join the University Aviation Association (UAA), Aviation Accreditation Board International (AABI), and Women in Aviation.*

Initial Response: We agree. Resources for membership fees and travel resources are required. We would need to work toward an AABI accreditation with curriculum revision and additional staff/ faculty resources. Only two Canadian institutions are accredited: Mount Royal University and Seneca College Flight Training Program.

Progress Update: We are now active members of the [University Aviation Association \(UAA\)](#), a North American organization with 120 universities and colleges with aviation programs (an AVIA professor serves on the Board of the UAA). We also host a student chapter of [Women in Aviation](#) (2018).

Work plan: We are exploring the possibilities of joining the [Air Transport Association of Canada \(ATAC\)](#), with plans to become members in 2019-20. Pursuing accreditation from the [Aviation Accreditation Board International \(AABI\)](#) is currently not planned. Faculty staff and simulator resources are not at a level to go for accreditation at this time. Also, cost is approximately \$18,000 US to prepare the accreditation proposal and site visits.

Responsibility: Director of Aviation

12. Reviewer Comments: *Create a University of Waterloo Flight Standards Committee for Quality Assurance Purposes and hire or contract a qualified flight standards pilot.*

Initial Response: We disagree. At the present time oversight of flight training is with WWFC. Students are prepared for the various flight credentials. Examinations and licensing of credentials is the responsibility of the Department of Transport, Civil Aviation. Although appropriate for accreditation by AABI, university resources are more appropriately directed to Waterloo Aviation faculty. Currently the Aviation Director and Associate Director sit on the Conestoga College Program Advisory Committee with members from the Aviation Industry and Airlines. We both utilize WWFC as the flight training school (Conestoga College for 18 years). In the spirit of regional co-operation, this committee serves the needs of both institutions.

Progress Update: Waterloo currently has members on the Conestoga College Program Advisory Committee (PAC).



Work plan: As the Waterloo aviation program has grown, our perspective has shifted on this issue. We are planning to put together a small advisory group of industry representatives, to provide oversight and feedback on both the academic and flight-related aspects of the program. Seek to have this in place by the winter/spring of 2020.

Responsibility: Director of Aviation, Aviation faculty, staff and students with representation from WWFC

13. Reviewer Comments: *Create a tenure-track faculty position (that includes a research component) with an aviation focus.*

Initial Response: We agree. This is one of the key components going forward with the Aviation programs in Science and Environment. The University of Waterloo program is unique and the first in Canada to offer a BES or a BSc degree in Aviation. Graduates from the program have the recognized Waterloo branding. In Geography and Aviation, a Geomatics Specialization with a Commercial Pilot Licence, Multi-Engine Rating and Instrument Flight Rating is possible. In Science and Aviation, a BSc academic credential is possible with an Earth Sciences Specialization, a Physics Specialization, or no specialization plan that is often associated with a Biology or Chemistry Minor. Additional options include Commercial Pilot Licence, Multi-Engine Rating, and Multi- Instrument Flight Rating. Graduates are ready for placement in many areas in the Aviation Industry, but most importantly, as pilots. In the first four graduating classes (2011 to 2014), Waterloo graduates are working across Canada from Newfoundland Labrador to British Columbia to Inuvik. Our graduates are also working as pilots with:

- the Canadian Military (search and rescue and training for fighter squadrons);
- international airlines such as Cathay Pacific (2nd officers);
- cargo and passenger operation in Canada's north for resource industries and isolated communities;
- Medivac work from Europe; and
- Corporate aircraft within North America.

Graduates also train some of our new pilots as flight instructors.

At this time, there are no full-time aviation faculty members at Waterloo. The first seven years of the program and the review, acknowledge success of this new program, as a small but important part of Canadian Aviation. The Aviation flight and ground school instruction components have been delivered by the Waterloo Wellington Flight Centre (WWFC), which has been in operation for over 80 years. The Waterloo Aviation academic component has been given by a sessional who is a Waterloo Alumni and an Air Canada captain. The sessional is respected by students as an experienced frontline pilot. We also have as an adjunct Aviation Professor and former astronaut. We have the nucleus for innovation and research but the program needs to grow with faculty who hold regular appointments to achieve this.

Progress Update: Dr. Suzanne Kearns was hired as a tenured Associate Professor of aviation on July 1, 2016. She conducts research, teaches four AVIA courses (100, 310, 315, and 320), supervises graduate students, and serves as a liaison for the program to industry partners.



Work plan: To support the ongoing growth of the program, an additional faculty position is required. The focus of the hire will be in the Faculty of Science. We have also suggested a hybrid 'aviation manager', a staff or lecture position role, with expertise in both aviation teaching, research, administration, aviation/aerospace expertise required (piloting experience desirable).

Responsibility: Director of Aviation in conjunction with Deans of Science, Environment and University administration.

14. Reviewer Comments: *Add 1.0-2.0 university credits (in addition to the 1.0 courses suggested in short-term opportunities, above) in aviation-related academic topics to target all of the Aviation Accreditation Board International (AABI) 'aviation core' subject areas over 3 to 5 years.*

Initial Response: We agree but note resource limitations. To add 1.0 to 2.0 additional Aviation units will require curriculum adjustment to potential core course requirements. The 'Science and Aviation' and 'Geography and Aviation' degrees meet the discipline focus of the degrees. With additional faculty and resources, the aviation focus of the degree can be further emphasized and still meet the rigor of the BSc and BES degrees. Some of the existing core courses can be replaced by some of the AABI recommended courses. It is important to build an academic aviation component.

Progress Update: Please see note under item #4. 2.0 aviation courses have been added to the course calendar. For *Aviation Accreditation Board International (AABI)* see Work Plan in #11

Work plan: Additional aviation offerings would be of benefit to students, yet this would require an additional faculty position.

Responsibility: Director of Aviation in conjunction with Deans and University administration.

15. Reviewer Comments: *Create a non-flight stream allowing students to complete academic courses (with the added aviation credits) to earn an aviation degree without the flying component.*

Initial Response: We disagree. At this stage of the program, Waterloo Aviation is currently known for its strength as a BSc or BES degree with flight training program. We are not considering a non-flight option degree. We are considering new UAV/UAS, AVIA courses that would include some non-flying components and flying components that could lead to an Aviation UAS Option. It is expected that within a few years Transport Canada will have regulations in place for 'Beyond Line of Sight operations'. This will likely require an Instrument Flight Rating (IFR) capable, remote pilot. There will be an emerging role for UAV specialists in a wide range of applications that can include extracting resources and monitoring pipelines, sea and lake ice, whales, hydro installations, environmental issues/ pollution and disasters. UAV specialists -- pilot/crews will be required to manage UAV use and data collection.

Progress Update: Although there is not currently a non-flying degree options, students from the variety of degree programs across campus can complete aviation course offerings that are available as electives to the campus community. These include AVIA 100, 315, and 374.



Work plan: In the future, we would like to expand the aviation offerings that are available to Waterloo students not currently in one of the aviation programs. We are also exploring the possibility of a non-flying aviation plan (this is in the early discussion/information-gathering stage).

Responsibility: Director of Aviation

16. Reviewer Comments: *Consider adding a 'Frozen' ATPL option for flight students.*

Initial Response: We agree. An integrated Airline Transportation Licence (ATPL) allows the captain or pilot to be in command of a multi-crew airplane. The ATPL for aviation students would include a Commercial Pilot Licence (CPL) Instrument Rating (IR) and the ATPL theory subjects complete. The written portion of the licence requirement is considered complete or 'frozen'. However, the Licence requirements are not complete until the pilot accumulates 1,500 total hours with a minimum of 250 hours as pilot in command. A pilot has 5 years to complete the flight requirements of the ATPL. Upon graduation from our program students will have about 200-205 total hours. Students will finish their in-airplane training as usual in spring of third year. In year 4, the simulation training would continue, culminating in the written ATPL.

Progress Update: A significant amount of work has been invested in adding the ATPL flight option (ATPL (frozen)) to our program offerings. This option became available as of fall 2017. An increase in admissions to 85 students in 2018, 125 in 2019 for the integrated program, signals an opportunity for growth (65 in 2017). The University Waterloo Aviation program is now the largest university aviation program in Canada. Aviation globally by 2036 will see a projected shortage of 240,000 pilots. In Canada, within the next 7 years we will see a shortage of approximately 6,000 pilots. Transport Canada indicates 1,200 commercial pilot licences earned each year in Canada, from all training sources. Fifty percent of these are to international flight training students, training in Canada and returning to Asia. In 2018, we had almost 600 applicants to our programs, and over 800 in 2019. Our objective over the next 3 years is an incremental growth to 125 incoming aviation students per year, by 2022. Our aviation flight-training partner, WWFC has agreed to support this growth. In order for our students to take advantage of the ATPL training, additional simulators will be required to increase the demand for training.

Work plan: Monitor integration of ATPL training path. Initiate funding opportunities from industry to meet the new training demand for simulator equipment.

Responsibility: Director of Aviation, WWFC and Office of Advancement.

17. Reviewer Comments: *Build an alumni network*

Initial Response: We agree. This work is ongoing, at both Waterloo and WWFC, to link graduates to social media for networking and career advancement.

Progress Update: This work is ongoing, in cooperation with WWFC. We have started to develop an alumni, mentorship program with are graduates to be available to students who are looking for pathways to various industry careers that our graduate now hold. Since our first graduating class in 2011, we now have pilots (First Officers and Captains) with all major airlines in Canada, the military, air cargo, UAV pilots, flight instructors, airborne survey and mapping, corporate pilots and air medivac.



As well, international companies such as Cathay Pacific. Waterloo Aviation graduates now fly to all continents, including Antarctica.

Work plan: Establish robust alumni network, invite key alumni to standards committee.

Responsibility: Director of Aviation & Instructor of AVIA 320 and Alumni Relations in the Faculties of Science and Environment.

Other Updates

The Science and Aviation Plans (Honours Science and Aviation; Honours Science and Aviation, Earth Science Specialization; and Honours Science and Aviation, Physics Specialization), have gone through two significant changes. First in fall 2017, the Science and Aviation Plans moved from 21 units to 20 units. This is in line with the Geography and Aviation Plan of 20 units.

In September 2019, the Science and Aviation Plans will remove the specialization plans, Earth Sciences Specialization and Physics Specialization. Science and Aviation will have one entry point. It will simplify the Ontario Universities Application Centre (OUAC) entry point to Honours Science and Aviation. Science and Aviation students can add a minor currently in Biology, Chemistry, Earth Science and Physics. The specializations are available in the 2018-19 calendar.



Updated Implementation Plan

	Recommendations	Initial Response and Proposed Actions	Progress to Date	Future Goals	Responsibility for Leading Actions
1.	Revise degree nomenclature	Disagreed	No actions	N/A	N/A
2.	Car share for students to airport	Agreed – action was to wait for the public transportation expansion expected 2017-2018	<p>The public transportation expansion was not implemented. This remains an issue for students.</p> <p>Groups of 3 or 4 students continue to book instructors at the same time and share a ride. Also using Facebook to organize rides from other students at all levels.</p>	<p>Bus currently comes within 4 km of airport and some students will use a bicycle to cover the rest or take an Uber. Anticipate that with operation of the ION, and residential growth in Breslau, new bus routes will be aligned to cover the airport.</p> <p>Will continue to advocate for public transportation to access.</p>	Director of Aviation, AVIA Faculty and WWFC
3.	Internship opportunities for students were suggested.	We agreed on the benefits of this experience, but there are difficulties incorporating this into the program (considering the timelines of flight training)	<p>After exploring this possibility, we decided the impact would be limited as most flight students choose to pursue additional flying during this phase. Instead, we chose to focus on incorporating enhanced industry cooperation within their academic work. This includes working with CEE to improve their job-readiness skills (4 CECA sessions are now embedded within academic courses throughout their degree plans). In addition, experiential learning assignments where students collaborate with industry partners provide opportunities for real-world problem solving and industry networking, have been incorporated within AVIA 100, 310, 315, and 320.</p> <p>Since the review, several direct job pathway programs have been established (with Sunwing, Jazz, and Porter Airlines)</p>	<p>Continue to enhance experiential learning opportunities for aviation students.</p> <p>In the Fall of 2018, AVIA 310 will incorporate an assignment using the Riipen platform. Airline industry partners will submit assignments, collaborate with students, and rate performance.</p> <p>Following an assessment of Riipen within AVIA 310 an assessment will determine whether this software will be used in other AVIA courses as well.</p>	Director of Aviation & Instructor of AVIA courses



			which allow our graduates an expedited pathway to an airline pilot position.		
4.	Create 2 new 0.5 courses on aviation topics	Agreed – new academic aviation (AVIA) offerings have been added to the course calendar	Since the report, AVIA 310 has been completely redeveloped and three new aviation academic courses have been added to the curriculum (AVIA 100, AVIA 315, and AVIA 320). AVIA 374 on Unmanned Aerial Systems has been taught three times.	Monitor student evaluations of new course offerings, and liaise with aviation industry colleagues to ensure course content is aligned with professional competencies.	Director of Aviation & Instructor of AVIA Courses
5.	Add a significant culminating upper year experience in aviation	Agreed – we planned to explore possibilities for a 4 th year AVIA course with a culminating experience.	A new upper-year aviation course (AVIA 320) was added to the curriculum in the Winter of 2018. AVIA 320 incorporates a ‘safety challenge’ for students, which they work on throughout the semester. Their solutions are presented to a panel of industry judges at the end of the term.	Explore methods to enhance this culminating experience. The Riipen platform that facilitates experiential learning and industry partners will be explored for this purpose beginning in the Winter of 2019.	Director of Aviation & Instructor of AVIA 320
6.	Mandatory flight training in 4 th year to avoid flight skills becoming ‘rusty’.	Agreed – yet it was pointed out that most students pursue a flight instructor or a float rating during this time.	The aviation industry has evolved significantly since the time of the original report and our program has adapted. 4 th year students now have the option of seeking employment through one of our airline partnership programs (Sunwing, Jazz, or Porter Airlines). WWFC has responded by creating a new training program, including multi crew coordination training, to help students gain the skills they require to fly large complex aircraft. This additional training is optional (as it does carry additional costs).	Beginning in the fall of 2017, incoming first year students have the option of choosing a different pathway for their flight education. This pathway would lead them to earn an Integrated Airline Transport Pilot Licence (IATPL), which would support their path more directly into an airline pilot position. This is an optional pathway, but is an indication that flight training within the program is evolving to meet industry needs.	Director of Aviation & WWFC
7.	Incorporate crew coordination training.	Agreed	Please see response to item #6.	N/A	N/A
8.	Incorporate more student involvement in flight training, such as with elementary	Limited potential	Students are encouraged to participate in the safety management process at WWFC, through submitting safety reports and safety meetings.	Ongoing	WWFC



	maintenance and in safety briefings.				
9.	Explore a specialization in UAV/UASs	Agreed – we have pursued the possibility of incorporating additional coursework in Remotely Piloted Aircraft Systems (RPASs)	GEOG 374, a special topics course exploring the use of drones, is now running annually and attracts both Aviation students and those from other programs.	We are exploring the possibility of an RPAS option, which would be available to students not currently enrolled in an aviation program.	Director of Aviation & AVIA faculty members
10.	Collaboration with Western and Windsor’s aviation programs	Agreed, but a lower priority goal.	Conestoga College and Western’s aviation students have been invited to campus annually, to attend Chris Hadfield’s guest lecture. To support our outreach to the international aviation community, Waterloo’s aviation program has partnered with the International Civil Aviation Organization (ICAO) to launch a free online course called ‘Fundamentals of the Air Transport System’. This course provides free, accessible, online learning to an international audience (www.icao.int/fats).	We remain open to collaborative opportunities. We monitor and report on the impacts of the FATS course annually.	Director of Aviation
11.	Join aviation industry associations	Agreed.	We are now active members of the University Aviation Association (UAA) and host a student chapter of Women in Aviation.	We are exploring the possibilities of joining the Air Transport Association of Canada (ATAC), with plans to become members in 2018-19 Pursuing accreditation from the Aviation Accreditation Board International (AABI) is not currently planned.	Director of Aviation
12.	Create a University of Waterloo Flight Standards Committee for Quality Assurance purposes	Disagreed	Waterloo currently has members on the Conestoga College Program Advisory Committee (PAC).	As the Waterloo aviation program has grown, our perspective has shifted on this issue. We are exploring possibilities of putting together a small advisory group of industry representatives, to provide oversight and feedback on both	Director of Aviation



				the academic and flight-related aspects of the program. Seek to have this in place by the Winter of 2019.	
13.	Create a tenure-track faculty position that includes a research component with an aviation focus	Agreed – plan was a first academic hire in 2016 and a second in 2017.	Dr. Suzanne Kearns was hired as a tenured Associate Professor of aviation on July 1, 2016. She conducts research, teaches four AVIA courses (100, 310, 315, and 320), supervises graduate students, and serves as a liaison for the program to industry partners.	To support the ongoing growth of the program, an additional faculty position is required. We have suggested a hybrid-role, with expertise in both aviation teaching, administration, and flight training would significantly enrich the program offerings.	Director of Aviation in conjunction with Deans and University administration.
14.	Add 1.0-2.0 university credits (in addition to those mentioned in item #4) in aviation related topics	Agreed – but resource limitations are noted	Please see note under item #4. 2.0 aviation courses have been added to the course calendar.	Additional aviation offerings would be of benefit to students, yet this would require an additional faculty position.	Director of Aviation in conjunction with Deans and University administration.
15.	Create a non-flight stream allowing students to complete academic courses without the flying component	Disagreed - as Waterloo is not known as a non-flying program.	Although there is not currently a non-flying degree options, students from the variety of degree programs across campus can complete aviation course offerings that are available as electives to the campus community. These include AVIA 100, 315, and 374.	In the future, we would like to expand the aviation offerings that are available to Waterloo students not currently in the aviation program.	Director of Aviation
16.	Consider adding a 'Frozen' ATPL option for flight students	Agreed	A significant amount of work has been invested in adding this flight option to our program offerings. This option is available as of fall 2017. An increase in admissions to 85 students in 2018 for the integrated program, signals an opportunity for growth (65 students in 2017). In 2018, we had almost 600 applicants to our programs. Our objective over the next 4 years is an incremental growth to 125 incoming aviation students per year, by 2022. Our aviation flight-training partner, WWFC has agreed to support this growth. In order for our students to take	Monitor integration of ATPL training path. Initiate funding opportunities from industry to meet the new training demand for simulator equipment.	Director of Aviation, WWFC and Alumni Relations



			advantage of the ATPL training, additional simulators will be required to meet the demand.		
17.	Build an alumni network	Agreed	This work is ongoing, in cooperation with WWFC.	Establish robust alumni network, invite key alumni to standards committee.	Director of Aviation & WWFC Staff, Alumni Relations

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: _____ 2021-2022
Date

Signatures of Approval:

Chair/Director 12 September 2018
Date

AFIW Administrative Dean/Head (For AFIW programs only) Date
2 October 2018

Faculty Dean Environment Date

Faculty Dean Science Date
2-10-18

Associate Vice-President, Academic Date
March 26, 2019

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

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

Checklist for SUC/SGRC Reviewer Feedback Quality Assurance Office

Two-Year Progress Report: Science and Aviation / Geography and Aviation

Name of Reviewer: Alysia Kolentsis

Date: 2/3/2020

Does the Two-Year Progress Report:

1. Clearly describe progress achieved on the various action items in the implementation plan? Yes No
2. Explain convincingly any circumstances that would have altered the original implementation plan? Yes No
3. For items that are behind schedule, propose an amended implementation schedule that is reasonable and credible? Yes No
4. Address significant developments or initiatives that have arisen since the program review process, or that were not contemplated by the program review process? Yes No

General Comments

The responses to the reviewers' comments and suggestions were consistently thorough and convincing. The few instances for improvement that I noted in my evaluation – namely, concerning the transportation links to the airport and the recommendation for a capstone course – were thoughtfully considered, and I am satisfied with the updated action plans.

NEW UNDERGRADUATE SCHOLARSHIPS, AWARDS, and BURSARIES

to be added to the Undergraduate Awards Database

- submitted for the March 10, 2020 meeting of Senate Undergraduate Council -

ENTRANCE AWARDS

Hedy and Graham Burton Arts Entrance Scholarship

A scholarship, valued at up to \$5,000, will be awarded annually to a full-time undergraduate student entering Year One of any program in the Faculty of Arts. Selection will be based on academic excellence (minimum 80% admission average) combined with extracurricular and leadership involvement in their community as assessed through the Admission Information Form. Preference will be given to students interested in studying a humanities program. This fund is made possible by a generous donation from Jolyon Burton, BA'00, and is named after his parents, Hedy and Graham Burton.

Method of financing: annual donation + progressive endowment

Jones Family Scholarship

A scholarship, valued at \$4,000, will be awarded annually to an outstanding full-time undergraduate student entering Year One of any program in the Faculty of Engineering. Selection is based on academic excellence (minimum 80% admission average) combined with extracurricular achievements and leadership involvement as assessed through the Admission Information Form. This fund is made possible by a donation from Howard and Sandra Jones.

Method of Financing: annual donation (two-year pledge)

Foo-man Li and Shang-jen Wong Bursary for Women

Two bursaries, valued at up to \$9,500 each, will be awarded to full-time female undergraduate students enrolling in Year One of an eligible program in the Faculty of Mathematics (excluding Computer Science) or the Department of Physics & Astronomy in which women are underrepresented. Selection will be based on academic achievement (minimum admission average of 80%) combined with demonstrated financial need as determined by Waterloo. To be considered, students must complete the University of Waterloo Entrance Bursary application by April 15. Recipients will receive \$2,000 in Year One, and an additional \$2,500 in each of Year Two, Three, and Four. Payments beyond first year are dependent on continued full-time enrolment in an eligible Mathematics or Physics program, as well as maintaining a 70% cumulative average each year. The donors are making this gift in honour of their late parents. Their mother was a strong believer in women studying Mathematics and Physics.

Method of Financing: one-time donation

Mofizur Rahman Memorial Scholarship

A scholarship, valued at \$2,500, will be awarded annually to an outstanding female undergraduate student enrolled in Year One of any program in the Faculty of Engineering wherein women are underrepresented. Selection is based on academic achievement combined with extracurricular and leadership involvement as assessed through the Admission Information Form. This fund is made possible by a donation from Akbar Rahman in memory of his dear father, Mofizur Rahman.

Method of Financing: annual donation (four-year pledge)

Kenneth Gordon Savery Memorial Scholarship

A scholarship, valued at approximately \$1,500, will be awarded annually to a full-time undergraduate student enrolled in Year One of any program in the Faculty of Applied Health Science, Engineering, Mathematics, or Science on the basis of academic excellence. This fund is made possible by a donation from Michael Yeo in memory of his grandfather, Kenneth Gordon Savery.

Method of Financing: endowment

NEW UNDERGRADUATE SCHOLARSHIPS, AWARDS, and BURSARIES

to be added to the Undergraduate Awards Database

- submitted for the March 10, 2020 meeting of Senate Undergraduate Council -

Sprickerhoff Family Bursary for Women in Mathematics

One bursary, valued at \$5,000, will be awarded annually to a full-time female undergraduate student entering Year One of any program in the Faculty of Mathematics, wherein women are underrepresented (excluding Software Engineering). Preference will be given to students enrolling in Computer Science. Preference will also be given to candidates from Milton, Caledon, Acton, Halton Hills, Georgetown, or Brampton. Selection will be based on academic excellence and demonstrated financial need, as determined by Waterloo. To be considered, students must complete the University of Waterloo Entrance Bursary application by April 15. This fund is made possible by a donation from the Sprickerhoff family to encourage young women to pursue studies in STEM disciplines.

Method of Financing: annual donation (four-year pledge)

Jason Thean Engineering Entrance Bursary

A bursary, valued at \$2,000, will be awarded annually to a full-time undergraduate student enrolled in Year One of any program in the Faculty of Engineering who has demonstrated financial need as determined by Waterloo. To be considered, students must complete the University of Waterloo Entrance Bursary application. This fund is made possible by a donation from alumnus Jason Thean (BAsc '07, Software Engineering).

Method of Financing: annual donation (five-year pledge)

Traquair Family Award in Arts

Two awards, valued at up to \$20,000 over eight academic terms, will be awarded annually to deserving undergraduate students entering Year One of full-time degree studies in any program in the Faculty of Arts (excluding Accounting and Financial Management). Selection will be based on a combination of academic excellence and financial need as determined by Waterloo. To be considered, students must complete the University of Waterloo Entrance Bursary application by April 15. Recipients will receive \$2,500 per academic term for up to eight terms (1A-4B). Payments beyond Year One are dependent on maintaining a minimum overall average of 75% and full-time enrolment in the Faculty of Arts. This award is made possible by a donation from Janis Traquair (BA '79) and Brian Traquair (BMath '79).

Method of financing: annual donation + progressive endowment

Traquair Family Award in Mathematics

One award, valued at up to \$40,000 over eight academic terms, will be awarded to a deserving undergraduate student entering Year One of full-time degree studies in any program in the Faculty of Mathematics. Selection will be based on a combination of academic excellence, Admission Information Form, contest scores as assessed through the Centre for Education in Mathematics and Computing (CEMC), and on financial need as determined by Waterloo. To be considered, students must complete the University of Waterloo Entrance Bursary application by April 15. Recipients will receive \$5,000 per academic term for up to eight terms (1A-4B). Payments beyond Year One are dependent on maintaining a minimum overall average of 75% and full-time enrolment in the Faculty of Mathematics. This award is made possible by a donation from Brian Traquair (BMath '79) and Janis Traquair (BA '79).

Method of financing: annual donation + progressive endowment

NEW UNDERGRADUATE SCHOLARSHIPS, AWARDS, and BURSARIES

to be added to the Undergraduate Awards Database

- submitted for the March 10, 2020 meeting of Senate Undergraduate Council -

UPPER-YEAR AWARDS

Carey Bissonnette Memorial Scholarship

A scholarship, valued at up to \$1,200, will be awarded annually to a graduating undergraduate student in the Department of Chemistry in the Faculty of Science. Selection is based on academic achievement (minimum 80% cumulative average) combined with a commitment to undergraduate research or teaching assistantships. An application is not required. This fund has been made possible by family and friends of Carey Bissonnette, a dedicated colleague, lecturer, academic advisor and teaching fellow at the University of Waterloo where he devoted himself for over 24 years.

Method of Financing: endowment

Janet Law-Yip Memorial Award

An award, valued at up to \$1,000, will be provided annually to a full-time undergraduate student enrolled in Year Three or Four of any program in the Faculty of Engineering. Selection is based on academic achievement (minimum 75% cumulative average) combined with extracurricular involvement and/or volunteer activities. Preference will be given to students who have participated in student government. Interested students should submit an application by October 1. This fund is made possible by a donation from Janet Law-Yip's family and friends in her memory.

Method of Financing: endowment

Shamim Mapara Philosophy Scholarship

One or more scholarships, valued at \$2,000 each, will be awarded annually to one or more full-time undergraduate students enrolled in Year Three or Four in the Department of Philosophy in the Faculty of Arts. Selection is based on academic excellence (minimum 80% cumulative average) combined with coursework in multidisciplinary studies which demonstrates the student's holistic approach to learning. Interested students should submit an on-line application by October 15. This scholarship has been established by a donation from Nina Mapara (BSc '94, BA '96) in honour of her mother.

Method of Financing: annual donation (five-year pledge)

Jack and Annie Scott History Scholarship

A scholarship, valued at up to \$1,200, will be awarded annually to a full-time undergraduate student entering Year Two in the Faculty of Arts who has declared History as their major. Selection will be based on academic excellence (minimum 80% cumulative average). No application is necessary. This fund is made possible by a donation from the estate of Eileen Wiegand in honour of her parents, Jack (a member of the founding University of Waterloo Board of Governors) and Annie Scott, who, by their example, instilled in Eileen a strong commitment to community and an understanding of the importance of education.

Method of Financing: endowment

NEW UNDERGRADUATE SCHOLARSHIPS, AWARDS, and BURSARIES

to be added to the Undergraduate Awards Database

- submitted for the March 10, 2020 meeting of Senate Undergraduate Council -

John Tattersall Memorial Award

An award, valued at up to \$1,200, will be provided annually to a full-time undergraduate Canadian Indigenous student enrolled in Year Two, Three, or Four in any program in the Faculty of Engineering. Selection is based on academic excellence (minimum 75% cumulative average). An application is not required. To be considered, students must have self-identified as a Canadian Indigenous person on their University application through OUAC. Nominated students will be asked to provide a copy of their status card to confirm eligibility. This fund is made possible by a donation from The Tattersall Family.

Method of Financing: endowment

Lynne and Peter Woolstencroft Experiential Learning Award

Awards of varying value are available to full-time undergraduate students enrolled in the Faculty of Arts who wish to participate in an extracurricular activity that will enhance their education in their program of study or an experiential activity tied to a course where the cost is not covered by their tuition. Selection is based on academic achievement (minimum 70% cumulative average) and a demonstration of how the activity will benefit the student's knowledge acquisition, professional development, or enrich their in-class learning. Interested students must apply by completing an application form and submit it to the Administrative Co-ordinator, Arts Undergraduate Office. This fund is made possible by a donation from Professor Emeritus Peter Woolstencroft, a revered educator and passionate advocator for experiential student learning.

Method of financing: annual donation + progressive endowment

ATHLETIC AWARDS

Gary Boug Memorial Football Excellence Award

One or more awards, valued at up to \$4,500 each, are given to members of the varsity football team. This award recognizes "ACE": attitude, character and enthusiasm. This fund is supported by friends and family of former Warriors Football Coach Gary Boug, in memory of the positive impact that Gary had on so many lives.

Method of Financing: one-time collection of pooled donations (possibly more in future)

INTERNATIONAL EXPERIENCE AWARDS

Ella Dinoi International Experience Award

An award, valued at up to \$1,200, will be provided annually to a full-time undergraduate student enrolled in Year Three or Four in the School of Architecture who is pursuing an international study or co-op opportunity. Candidates must have a minimum cumulative average of 75%. Preference will be given to students who have a demonstrated passion for design excellence. To be considered, students must submit the general University of Waterloo International Experience Award application by July 15th. This fund has been established by friends and family in memory of Ella Dinoi (BArch '98, Waterloo). Ella's incomparable creative spirit and passion for design was respected by colleagues, professors, classmates and clients in Canada, Italy, and internationally.

Method of Financing: endowment

University of Waterloo
SENATE
Report of the President
20 April 2020

FOR INFORMATION

Recognition and Commendation

The **John D. and Catherine T. MacArthur Foundation** announced that **Waterloo Institute for Sustainable Energy (WISE)** was among the highest-scoring proposals, designated as the Top 100, in its 100&Change competition for a single \$100 million grant to help solve one of the world’s most critical social challenges. The Top 100 proposals underwent MacArthur’s initial administrative review, a Peer-to-Peer review, an evaluation by an external panel of judges, and a technical review by specialists whose expertise was matched to the project. Each proposal was evaluated using four criteria: impactful, evidence-based, feasible, and durable. The proposal by WISE, entitled “Mending Broken Lives Through Clean Energy Solutions,” seeks to end the vicious cycle of poverty fed by lack of access to energy. The ambition is to accelerate the deployment of clean distributed energy solutions, on a massive scale in order to reach more than a billion people globally, who otherwise would have no access. The comprehensive technical plan combines reliable support of energy with community self-sufficiency and self-determination. Income for livelihood, skills development at all educational levels, learning through play and empowerment of women are all central aspects of the proposal to create a positive pathway out of humanitarian crises. Energy access is the first step: a launch pad for education and a path out of extreme poverty. MacArthur’s Board of Directors will select up to 10 finalists from the high-scoring proposals this spring.

(adapted from the *Daily Bulletin*, 26 February 2020)

The **University of Waterloo** has been named one of **Canada’s Best Diversity Employers**. **Mediacorp Canada** and **The Globe and Mail** partner to publish the Best Diversity Employers ranking as part of the larger Canada’s Top 100 Employers competition. The University was cited for its participation in the UN’s HeForShe initiative, its recent review of its hiring practices and its implementation of unconscious bias training, its support of the recruitment and employment of neurodiverse students in co-op jobs, and the establishment of a research grant of \$80,000 per year for the next five years to support research and scholarship focused on gender equality. Now in its 13th edition, the Canada’s Best Diversity Employers competition recognizes the nation’s leaders in creating inclusive workplaces for employees from five diverse groups: women; visible minorities; persons with disabilities; Aboriginal peoples; and lesbian, gay, bisexual and transgender (LGBT) peoples. The annual competition is open to any employer with its head office or principal place of business in Canada. Employers of any size may apply, whether in the private or public sector.

(adapted from the *Daily Bulletin*, 6 March 2020)

As part the HeForShe IMPACT 10x10x10 initiative, the University once again ran the **HeForShe Writing Contest** ahead of International Women’s Day. This year’s theme was LEGACY. Students, staff, faculty and alumni were invited to consider how the idea of legacy brings us to the present and how our choices today will impact generations to come. “These talented writers and poets inside this year’s anthology have already added so much to our community,” says Feridun Hamdullahpur, president and

vice-chancellor. “Their voices have broadened our perspectives and I congratulate each of the winners and all of our newly published writers on their wonderful pieces.” Judges from the University of Waterloo selected four winners, each of whom were awarded with a \$500 prize. Winners were recognized at Waterloo’s International Women’s Day dinner on Friday, March 6. Additional submissions have been published in the printed anthology.

Category winners include:

- Poetry: The Student and the Goose, **Sarasvathi Kannan** (BA ’16)
- Poetry: Dear Son, **Anna Wang**, student, Computer Science
- Fiction: Divine Intervention, **Sarasvathi Kannan** (BA ’16)
- Creative Non-Fiction: Contents of a Jewellery Box, **Anonymous student**

(adapted from the *Daily Bulletin*, 6 March 2020)

The Centre for Extended Learning is proud to announce the 2019 Online Teaching and Design Award Winners. *Introductory Psychology, PSYCH 101* has been awarded the **Online Course Design Award**. The author of PSYCH 101 is **Paul Wehr**, a lecturer in the Psychology, who has a passion for undergraduate instruction and support. PSYCH 101 ONLINE is a highly engaging course that uses a variety of strategies to help students learn course material efficiently, and to engage and motivate them. **Colleen McMillan** is this year’s winner of Waterloo’s **Online Instructor Award**. She is the instructor for *Social Work Practice In Mental Health – SWK 609R S2019*. Colleen aims to teach every student as if they are the only student in the class by “fostering a respectful relationship with each student; what they hope to achieve during the term, their unique interests and relationship to the content, and how they envision using the content in their career”.

(adapted from the *Daily Bulletin*, 12 March 2020)

President **Feridun Hamdullahpur** was honoured by the French government with the **Knight (Chevalier) order of the l’Order des Palmes Académiques (“Order of Academic Palms”)** on the evening of February 25 at the French Embassy in Ottawa. President Hamdullahpur was recognized for his accomplishments by the **French Ambassador to Canada Kareen Rispal**. The l’Order des Palmes Académiques is a national order bestowed by the French Republic to distinguished Academics and figures in the world of culture and education. Collaboration has been an integral part of the University’s development as a global institution. President Hamdullahpur has been an avid proponent of Waterloo’s partnerships including with several French universities, institutions and research colleagues for decades, leveraging our unique expertise and working on joint projects. This work includes the wide-ranging partnership with the Université de Bordeaux that on artificial intelligence and bio-based chemistry that recently celebrated its 10th anniversary, and the President’s role as an active member of the Sorbonne Université Strategic Orientation Committee since 2014.

(adapted from the *Daily Bulletin*, 13 March 2020)

UNIVERSITY OF WATERLOO
SENATE
Report of the Vice-President, Academic & Provost
20 April 2020

FOR INFORMATION

University Professor Designation

The 2020 University Professor designations: **Claudio Canizares** (Electrical & Computer Engineering), **Richard J. Cook** (Statistics & Actuarial Science) and **Lyndon Jones** (Optometry & Vision Science).

Waterloo has awarded this distinction to 26 other individuals: **Garry Rempel** (chemical engineering), **Mary Thompson** (statistics & actuarial science) and **Mark Zanna** (psychology) in 2004; **Terry McMahon** (chemistry), **Cam Stewart** (pure mathematics) and **Robert Jan van Pelt** (architecture) in 2005; **Phelim Boyle** (accountancy) and **Ian Munro** (computer science) in 2006; **Ken Davidson** (pure mathematics), **Keith Hipel** (systems design engineering) and **Jake Sivak** (optometry) in 2007; **Roy Cameron** (health studies & gerontology) and **Flora Ng** (chemical engineering) in 2008; **Ellsworth LeDrew** (geography & environmental management) and **Ming Li** (computer science) in 2009; **Stuart McGill** (kinesiology) and **Janusz Pawliszyn** (chemistry) in 2010, **Robert Le Roy** (chemistry) in 2011, **François Paré** (french studies) in 2012 and **Douglas Stinson** (computer science) in 2013; **William Cook** (combinatorics and optimization), and **William Coleman** (political science) in 2015; **Linda Nazar** (chemistry) in 2016, **Xuemin (Sherman) Shen** (electrical and computer engineering); **Joanne Wood** (psychology) in 2017; **Tamer Ozsü** (computer science) in 2018.

UNIVERSITY PROFESSOR

The University of Waterloo owes much of its international reputation and stature to the quality of its eminent professors. UW recognizes exceptional scholarly achievement and international pre-eminence through the designation “University Professor”. Once appointed, a faculty member retains the designation until retirement.

Not counting retirees, it is anticipated there will be one University Professor for approximately every 60 full-time regular faculty members, with at most two appointments each year. Such appointments are reported to Senate and the Board of Governors in March and April respectively, and are recognized at Convocation.

Selection Process

1. Annually, nominations will be sought from Faculty deans, directors of schools and department chairs, as well as from the university community generally. A nominee shall have demonstrated exceptional scholarly achievement and international pre-eminence in a particular field or fields of knowledge. The individual who nominates a colleague is responsible for gathering the documentation and submitting it to the vice-president academic & provost before the December break. The University Tenure & Promotion Committee will act as the selection committee; its decisions are final.
2. A nomination must be supported by at least six signatures from at least two UW departments/schools and must be accompanied by a curriculum vitae and a short, non-technical description of the nominee’s contributions.
3. A nomination must also be accompanied by letters from the nominee’s Dean, and from at least two and no more than five scholars of international standing in the nominee’s field from outside the University. The scholars are to be chosen by the nominee’s Chair/Director in consultation with the Dean and the nominator. The letter of nomination should explain why these particular scholars were chosen.
4. Letters soliciting comments from scholars shall be sent by the Chair/Director. Scholars shall be asked to comment on the impact and specific nature of the nominee’s most influential contributions, addressing their responses directly to the Vice-President, Academic & Provost.
5. The dossiers of unsuccessful nominees remain in the pool for two additional years. The appropriate Dean should provide updated information each year.

James W.E. Rush
Vice-President Academic & Provost

University of Waterloo
REPORT OF THE DEAN OF APPLIED HEALTH SCIENCES TO SENATE
April 20, 2020

FOR INFORMATION

A. APPOINTMENTS

Adjunct Appointment

Graduate Supervision

STEVENSON, Michael, Assistant Professor, School of Public Health and Health Systems, March 1, 2020 – February 28, 2023.

Graduate Supervision and Research

COSTA, Andrew, Department of Kinesiology, January 1, 2020 – December 31, 2023.

LAMBRAKI, Irene, Assistant Professor, March 10, 2020 – June 30, 2021.

LIPPEL, Katherine, School of Public Health and Health Systems, February 23, 2020 – December 31, 2024.

NEITERMAN, Elena, School of Public Health and Health Systems, March 10, 2020 – June 30, 2025.

RATTELLE, Mylene, School of Public Health and Health Systems, April 1, 2020 – April 1, 2025.

Research

VINE, Michelle, School of Public Health and Health Systems, April 1, 2020 – March 31, 2021.

Special Lecturer Appointments

ZAZA, Christine, Lecturer, Faculty of Applied Health Sciences, May 1, 2020 – August 31, 2020.

Postdoctoral Appointments

OCHOLA, Elizabeth, Department of Recreation and Leisure Studies, January 1, 2020 – April 30, 2020.

Postdoctoral Reappointments

SAARI, Margaret, School of Public Health and Health Systems, March 1, 2020 – April 30, 2020 (2-month extension at 70%).

PAROKARAN VARGHESE, Jessy, Department of Kinesiology, April 1, 2020 – June 30, 2020, extension.

VALAITIS, Renata, School of Public Health and Health Systems, April 1, 2020 – May 31, 2020.

Cross Appointment

CHEN, Helen, Continuing Lecturer, School of Public Health and Health Systems, Faculty of Applied Health Sciences to Statistics and Actuarial Sciences, Faculty of Math, March 1, 2020 – February 28, 2022.

A handwritten signature in blue ink, reading "Lili Liu".

**Lili Liu, Dean
Applied Health Sciences**

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF THE FACULTY OF ARTS TO SENATE
April 20, 2020

FOR INFORMATION

A. APPOINTMENTS

Visiting Appointment

EDWARDS, Richard, Visiting Researcher, Department of Psychology, February 25, 2020 to August 3, 2020.

B. ADMINISTRATIVE APPOINTMENTS

Administrative Reappointment

O'CONNOR, Dan, Department Chair, Sociology & Legal Studies, July 1, 2020 to August 31, 2024.

C. SABBATICAL LEAVES

Cancelled

MILLIGAN, Ian, Associate Professor, Department of History, July 1, 2020 to December 31, 2020, six months at 85% salary.

Change of Dates

BORITZ, J. Efrim, Professor, School of Accounting and Finance, *from* September 1, 2020 to August 31, 2021 *to* January 1, 2021 to December 31, 2021, twelve months leave at full salary.

COX, Jordana, Assistant Professor, Department of Communication Arts, *from* July 1, 2020 to December 31, 2020 *to* July 1, 2021 to December 31, 2021, six months leave at full salary.



Sheila Ager
Dean, Faculty of Arts

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF ENGINEERING TO SENATE
April 20, 2020

FOR INFORMATION

A. *APPOINTMENTS*

Tenured Appointments

MOMBAUR, Katja, Professor, Department of Systems Design Engineering (51%) and Department of Mechanical and Mechatronics Engineering (49%), March 1, 2020. Interdisciplinary PhD in Applied Mathematics (minors: Computer Science and Engineering Mechanics), IWR, University of Heidelberg, Heidelberg, Germany, 08/2001; PhD student, IWR, University of Heidelberg, Heidelberg, Germany, Member of IWR Research Training Group, 09/1997-08/2001; Studies of Aerospace Engineering, University of Stuttgart, Stuttgart, Germany, 10/1989-04/1995; Integrated Studies at the École nationale supérieure de l'aéronautique et de l'espace in Toulouse, France; 10/1993-08/1994. Professor Mombaur's research focuses on developing human-centered robotic technology. Such technology needs real motion intelligence and her research program integrates theory, computation, and experiment and connects engineering and mathematics to applied health sciences and the humanities to develop robots that directly collaborate with the human or act on the human body. Professor Mombaur's research fits into our departments' strategic objectives of increasing interdisciplinary research and further applying machine intelligence to robotics.

Probationary Term

SHAHSAVAN, Hamed, Assistant Professor, Department of Chemical Engineering, August 1, 2020 – June 30, 2023. PhD, Chemical Engineering and Nanotechnology, University of Waterloo, Waterloo, ON, 2017; MSc, Chemical Engineering and Nanotechnology, University of Waterloo, Waterloo, ON, 2011; BSc, Chemical Engineering, Sharif University of Technology, Tehran, Iran, 2009. Dr. Hamed Shahsavan is a young and promising researcher with already an enviable research record, and who possesses a broad knowledge of Chemical Engineering. His research interests are in the fields of medical micro-robotics, biomaterials and bio-interfaces. Of strategic importance to the Department is the unique research strengths he has acquired in soft robotics during his postdoc at the Max Planck Institute. This is an emerging research area and he has a very good potential to make a name in this research field.

Definite Term Reappointment Full-time

AHMADI, Lena, Lecturer, Department of Chemical Engineering, April 30, 2020 - April 28, 2022. PhD, University of Waterloo, Waterloo, ON, 2015; BSc, Iran, 2004.

KHADEMMOHTARAM, Nima, Lecturer, Department of Systems Design Engineering, July 4, 2020 – July 3, 2023. PhD, Mechanical Engineering, University of Victoria, Victoria, BC, 2014; MSc, Polymer Biomaterial Sciences, Iran Polymer and Petrochemical Institute, Tehran, Iran, 2008; BSc, Polymer Engineering, Tehran Polytechnic Montreal, Montreal, QC, 2006.

MANDAL, Kalikinkar, Research Assistant Professor, Department of Electrical and Computer Engineering, February 16, 2020 – July 31, 2020. PhD, University of Waterloo, Waterloo, ON, 2013; BSc, India, 2005.

Visiting Appointments

AMINI, Jalal, Professor, Department of Electrical and Computer Engineering, January 20, 2020 – September 30, 2020.

AZZI, Carl, Scholar, Department of Systems Design Engineering, May 18, 2020 – August 31, 2020.

EMBIRUCU, De Souza, Marcelo, Professor, Department of Chemical Engineering, July 1, 2020 – January 31, 2021.

GHARAEI GARAKANI, Hossein, Assistant Professor, Department of Electrical and Computer Engineering, January 27, 2020 – April 30, 2020.

JAFARI, Fatemeh, Researcher, Department of Electrical and Computer Engineering, January 14, 2020 – May 12, 2020.

KIRAZ, Nuri, Scholar, Department of Management Sciences, November 1, 2019 – October 31, 2021.

LEBLANC, Kevin, S., Researcher, Department of Electrical and Computer Engineering, February 4, 2020 – August 31, 2021.

YAN, Xiaoxia, Researcher, Department of Management Sciences, February 1, 2020 – January 31, 2021.

Visiting Reappointments

FAROOQ, Muhammad Umar, Researcher, Department of Chemical Engineering, January 1, 2020 – December 31, 2021.

KAZEMI, Nasser, Professor, Department of Chemical Engineering, April 1, 2020 – March 31, 2021.

REZENDEBARBOSA TURBIANI, Franciele, Associate Professor, Department of Chemical Engineering, February 13, 2020 – January 1, 2021.

XU, Lingyan, Scholar, Department of Systems Design Engineering, March 1, 2020 – May 1, 2020.

YANG, Anjia, Scholar, Department of Electrical and Computer Engineering, January 1, 2020 – April 30, 2020.

Adjunct Appointments

Graduate Supervision and Research

AYDEMIR, Nusret, Associate Professor, Department of Mechanical and Mechatronics Engineering, January 1, 2020 – December 31, 2022.

PANCHAL, Satyam, Assistant Professor, Department of Chemical Engineering, February 24, 2020 – February 23, 2022.

Adjunct Reappointments

Undergraduate Teaching

ROLLINS, Leanne, Lecturer, Department of Electrical and Computer Engineering, January 1, 2020 – April 30, 2020.

Adjunct Reappointments

Graduate Supervision and Research

PAN, Qinmin, Professor, Department of Chemical Engineering, January 1, 2020 – December 31, 2021.

RASHEED, Sarbast, Professor, Department of Systems Design Engineering, March 1, 2020 – February 28, 2023.

YOUNG, James, Associate Professor, Department of Systems Design Engineering, February 1, 2020 – January 31, 2023.

Cross Reappointments

NARASIMHAN, Sriram, Professor, Department of Civil and Environmental Engineering to Department of Mechanical and Mechatronics Engineering, June 22, 2020 – June 21, 2023.

WEBER, Mark, J., Professor and Eyton Director, Conrad School of Entrepreneurship and Business to Department of Management Sciences, March 1, 2020 – February 28, 2023.

B. ADMINISTRATIVE REAPPOINTMENTS

BORDELEAU, Anne, Director, School of Architecture, May 1, 2020 – April 30, 2024.

CROISET, Eric, Chair, Department of Chemical Engineering, May 1, 2020 – August 31, 2020.

GORBET, Maud, Interim Chair, Department of Systems Design Engineering, April 1 2020 -
July
31, 2020.

FOR APPROVAL BY THE BOARD OF GOVERNORS

C. SABBATICAL

MAZUMDAR, Ravi R., Professor, Department of Electrical and Computer Engineering, Early Sabbatical, November 1, 2020 – April 30, 2021 at 85% salary.

ROSENBERG, Catherine, Professor, Department of Electrical and Computer Engineering, Early Sabbatical, November 1, 2020 – April 30, 2021 at 85% salary.

SHEPPARD, Lola, Professor, School of Architecture, September 1, 2020 – August 31, 2021 at 100% salary.

ALREADY APPROVED BY THE BOARD OF GOVERNORS

D. SABBATICAL
CULHAM, Richard, Professor, Department of Mechanical and Mechatronics Engineering, July
1, 2020 – December 31, 2020 at 100% salary.



Richard Culham, Interim Dean
Faculty of Engineering

y of Engineering

Facult

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF THE FACULTY OF ENVIRONMENT TO SENATE
April 20, 2020

FOR INFORMATION

A. APPOINTMENTS

Probationary-Term Reappointments

Continuing Lecturer Appointments

Adjunct Appointments

Graduate Supervision

THORPE, Hilary, Assistant Professor, School of Environment, Resources and Sustainability, March 1, 2020 to December 31, 2024.

VAN DEN HEUVEL, Michael, Professor, School of Environment, Resources and Sustainability, March 1, 2020 to December 31, 2024.

WHITELAW, Graham, Associate Professor, Faculty of Environment, October 1, 2019 to December 31, 2021.

Graduate Supervision and Research

VINODRAI, Tara, Associate Professor, School of Planning, January 1, 2020 to December 31, 2023.

Special Appointments

Instruction

CADWELL, Francesca, Lecturer, Department of Geography and Environmental Management, May 1, 2020 to August 31, 2020.

CIARDULLI, Paolo, Lecturer, School of Planning, March 1, 2020 to April 30, 2020.

LEDREW, Ellsworth, Lecturer, Department of Geography and Environmental Management, May 1, 2020 to August 31, 2020.

LETOURNEAU, Marcus, Assistant Professor, School of Planning, May 1, 2020 to August 31, 2020.

Graduate Students Appointed as Part-Time Lecturer

BARR, Stephanie, Lecturer, Department of Geography and Environmental Management, May 1, 2020 to August 31, 2020.

Cross Appointments

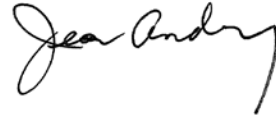
BARBEAU, Christine, Lecturer, School of Environment, Resources and Sustainability to Department of Geography and Environmental Management, March 1, 2020 to February 28, 2023.

B. ADMINISTRATIVE APPOINTMENTS

C. SABBATICAL LEAVES

For approval by the Board of Governors

AUGUST, Martine, Assistant Professor, School of Planning, July 1, 2020 to December 31, 2020 at 100% salary.

A handwritten signature in black ink that reads "Jean Andrey". The signature is written in a cursive style with a large initial "J" and a long, sweeping underline.

Jean Andrey
Dean

University of Waterloo
REPORT OF THE DEAN OF MATHEMATICS TO SENATE
April 20, 2020

FOR INFORMATION

A. APPOINTMENTS (for approval by the Board of Governors)

Probationary-Term Appointments

MANDELSHTAM, Olya (BS, 2010, California Institute of Technology; PhD, 2016, University of California, Berkeley), Assistant Professor, Dept. of Combinatorics and Optimization, January 1, 2021 – June 30, 2024. Dr. Mandelshtam comes to us from Brown University where she is a Tamarkin Assistant Professor. Her interests lie at the intersection of enumerative and algebraic combinatorics with statistical mechanics, and her work is motivated by studying the connections of the asymmetric simple exclusion process with orthogonal polynomials, such as Askey-Wilson, Macdonald and Koornwinder polynomials. Dr. Mandelshtam's research stands out due to its depth and centrality in the area of algebraic combinatorics, and her hire will strengthen the algebraic combinatorics group in the department.

PECHENIK, Oliver (BA, 2010, Oberlin College; PhD, 2016, University of Illinois at Urbana-Champaign), Assistant Professor, Dept. of Combinatorics and Optimization, July 1, 2020 – June 30, 2023. Dr. Pechenik completed his PhD from the University of Illinois at Urbana-Champaign where his thesis was awarded the Philippe Tondeur Dissertation Prize. He is currently an NSF Postdoc at the University of Michigan. His research interests lie in algebraic combinatorics, with a focus on dynamics, modern symmetric function theory, and relations to Schubert calculus. Dr. Pechenik is widely regarded as rising star in algebraic combinatorics, has a stellar research record, and is a very engaging speaker. His excellence in research and teaching make him a valuable asset to the department.

Definite Term - Reappointments

PETRICK, Mark, Lecturer, David R. Cheriton School of Computer Science, September 1, 2020 – August 31, 2021.

Continuing Lecturers

BELTAOS, Andrew, Lecturer, Office of the Dean, July 1, 2020.

KNOLL, Carolyn, Lecturer, Office of the Dean, July 1, 2020.

SPEZIALE, Sean, Lecturer, Office of the Dean, July 1, 2020.

Visiting Appointments

LEE, Leila Hyelip, Researcher, David R. Cheriton School of Computer Science, March 1, 2020 – February 28, 2021.

RAVICHANDRAN, Thambirajah, Research Associate, Dept. of Applied Mathematics, March 1, 2020 – July 31, 2020.

Adjunct Appointments

Research

HU, Peng (National Research Council of Canada), Professor, Dept. of Statistics and Actuarial Science, March 1, 2020 – February 28, 2023.

Adjunct Reappointments

Instructor

SHARMA, Puneet, Lecturer, Dept. of Applied Mathematics, May 1, 2020 – August 31, 2020.

Cross Reappointments

FISCHMEISTER, Sebastian (Associate Professor, Dept. of Electrical and Computer Engineering), in the David R. Cheriton School of Computer Science, March 1, 2020 – June 30, 2023.

Postdoctoral Fellows appointed as Part-time Lecturers

DAS, Pranabesh, Dept. of Pure Mathematics, June 1, 2020 – May 31, 2021.



Kevin Hare
Interim Dean

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF SCIENCE TO SENATE
April 20, 2020

For information:

A. APPOINTMENTS

Adjunct Appointments

CARDUCCI, Jillian, Assistant Clinical Professor, School of Pharmacy, March 1, 2020 to February 28, 2023.

Adjunct Reappointments

Graduate Supervision

McKENZIE, Iain, Assistant Professor, Department of Physics and Astronomy, March 1, 2020 to July 31, 2024.

Other

THIESEN, Jake, Professor, School of Pharmacy, April 1, 2020 to March 31, 2023.

Graduate Supervision and Research

MORENO-HAGELSIEB, Gabriel, Associate Professor, Department of Biology, January 1, 2020 to June 30, 2023.

Graduate Instruction, Graduate Supervision and Research

BRANCZYK, Agata, Associate Professor, Department of Physics and Astronomy, April 1, 2020 to September 1, 2024.

GOTTESMAN, Daniel, Professor, Department of Physics and Astronomy, May 1, 2020 to August 31, 2025.

Cross Reappointment

MIELKE, John G., Associate Professor, School of Public Health and Health Systems, cross appointed to School of Pharmacy, June 1, 2020 to May 31, 2023.

SCIAINI, German, Associate Professor, Department of Chemistry, cross appointed to Department of Physics and Astronomy, February 1, 2020 to December 31, 2023.

B. ADMINISTRATIVE REAPPOINTMENT

EVANS, Stephen, Director, Geological Engineering Program, joint between the Faculties of Science and Engineering, March 1, 2020 to February 28, 2021.

FOR APPROVAL BY THE BOARD OF GOVERNORS**C. SABBATICAL LEAVES**

FICH, Michel, Professor, Department of Physics and Astronomy, January 1, 2021 to December 31, 2021, 100% salary arrangement.

MA, Kesen, Associate Professor, Department of Biology, September 1, 2020 to August 31, 2021, 100% salary arrangement.

POWER, Michael, Professor, Department of Biology, September 1, 2020 to February 28, 2021, 100% salary arrangement.

ROSE, David, Professor, Department of Biology, Early Sabbatical March 1, 2021 to August 31, 2021 and 4 for 4 Exchange, September 1, 2021 to December 31, 2021, 100% salary arrangement.



R.P. Lemieux
Dean

RPL/lw

University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
Report to Senate
20 April 2020

Senate Graduate & Research Council met on 9 March 2020 and agreed to forward the following items to Senate for approval as part of the regular agenda.

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

FOR APPROVAL

PROGRAM CHANGE

Faculty of Engineering

1. **Motion:** To approve 1 new specialization within the Master of Engineering (MEng) in Chemical Engineering, effective 1 May 2020, as presented in Attachment 1.

Rationale: The proposed MEng specialization (Biological Engineering) will enhance the existing program by providing the option for students to receive advanced specialized training in specific areas within the discipline of Chemical Engineering in which the department both has (i) a research strength and (ii) there is a strong employment market demand.

ADDITION OF A PROGRAM

Faculty of Mathematics

1. **Motion:** To approve the addition of a PhD in Pure Mathematics – Quantum Information, effective 1 May 2020, as presented in Attachment 2.

Rationale: The Department of Pure Mathematics is joining the existing Quantum Information (QI) collaborative program through the addition of a PhD in Pure Mathematics – Quantum Information program. While the QI Collaborative program is currently offered by numerous departments at the university, Institute for Quantum Computing (IQC) - affiliated faculty in the Pure Mathematics department would also like for their students interested in QI to be able to participate in the program. In addition, there are graduate students and prospective graduate students who are interested in pure mathematics as it relates to quantum information, and who have also expressed interest in enrolling in this program when it becomes available, so it is expected there will be demand for the program, and that it will help with recruitment.

2. **Motion:** To approve the addition of a MMath in Pure Mathematics – Quantum Information, effective 1 May 2020, as presented in Attachment 3.

Rationale: For the same rationale as presented above, the Department of Pure Mathematics is joining the existing Quantum Information (QI) collaborative program through the addition of a MMath in Pure Mathematics – Quantum Information program.

GRADUATE STUDIES - ACADEMIC CALENDAR CHANGES

1. **Motion:** To approve Graduate Studies' Academic Calendar changes (under Policies and Guidelines) pertaining to University responsibilities regarding supervisory relationships, effective 1 May 2020, as presented in Attachment 4.

Rationale: University responsibilities regarding supervisory relationships have been developed to provide better clarity of expectations for students and faculty as to what is expected when a relationship between a student and a supervisor ends.

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

Charmaine Dean
Vice President, Research & International



Graduate Studies Program Revision Template

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

Faculty: Engineering

Program: Master of Engineering (MEng) in Chemical Engineering

Program contact name(s): Nasser M. Abukhdeir

Form completed by: Colleen Mechler/Judy Caron

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](#)).

Update of MEng degree requirements to include 1 new specialization.

Note: the content in the "Current Graduate Studies Academic Calendar content" column includes material that was approved by SGRC on December 9, 2019, which also takes effect Spring 2020.

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

Rationale for change(s):

The proposed MEng specializations will enhance our existing program by providing the option for students to receive advanced specialized training in specific areas within the discipline of Chemical Engineering in which our department both has (i) a research strength and (ii) there is a strong employment market demand.

Proposed effective date: Term: Spring Year: 2020

Additional Specialization Information:

Biological engineering is a sub-discipline of Chemical Engineering that focuses on the production or use of biological "parts" or biological organisms. This specialization provides MEng students with an advanced training geared towards the biopharmaceutical or specialty (bio chemical industries making them attractive to both local and global markets.

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/engineering/department-chemical-engineering/master-engineering-meng-chemical-engineering>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<p>Graduate specializations</p> <ul style="list-style-type: none"> • Polymer Science and Engineering • Process Systems Engineering <p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Program type <ul style="list-style-type: none"> ○ Master's ○ Professional • Registration option(s) <ul style="list-style-type: none"> ○ Full-time ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Coursework • Additional program information <ul style="list-style-type: none"> ○ Important notice for MEng applicants: applicants to the MEng program are expected to be entirely self funded. No financial assistance will be provided from the Department of Chemical Engineering or the University of Waterloo. <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ A 75% overall standing in the last two years, or equivalent, in a four-year Honours Bachelor's degree or equivalent. • Application materials <ul style="list-style-type: none"> ○ Résumé ○ Supplementary information form ○ Transcript(s) • References <ul style="list-style-type: none"> ○ Number of references: 2 ○ Type of references: at least 1 academic • English language proficiency (ELP) (if applicable) <p>Degree requirements</p> <ul style="list-style-type: none"> • Graduate Academic Integrity Module (Graduate AIM) • Courses 	<p>Graduate specializations</p> <ul style="list-style-type: none"> • <u>Biological Engineering</u> • Polymer Science and Engineering • Process Systems Engineering <p>Program information</p> <ul style="list-style-type: none"> • Admit term(s) <ul style="list-style-type: none"> ○ Fall • Delivery mode <ul style="list-style-type: none"> ○ On-campus • Program type <ul style="list-style-type: none"> ○ Master's ○ Professional • Registration option(s) <ul style="list-style-type: none"> ○ Full-time ○ Part-time • Study option(s) <ul style="list-style-type: none"> ○ Coursework • Additional program information <ul style="list-style-type: none"> ○ Important notice for MEng applicants: applicants to the MEng program are expected to be entirely self funded. No financial assistance will be provided from the Department of Chemical Engineering or the University of Waterloo. <p>Admission requirements</p> <ul style="list-style-type: none"> • Minimum requirements <ul style="list-style-type: none"> ○ A 75% overall standing in the last two years, or equivalent, in a four-year Honours Bachelor's degree or equivalent. • Application materials <ul style="list-style-type: none"> ○ Résumé ○ Supplementary information form ○ Transcript(s) • References <ul style="list-style-type: none"> ○ Number of references: 2 ○ Type of references: at least 1 academic • English language proficiency (ELP) (if applicable) <p>Degree requirements</p> <ul style="list-style-type: none"> • Graduate Academic Integrity Module (Graduate AIM)

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> ○ Students must complete CHE 600 Engineering and Research Methods, Ethics, Practice, and Law (0.25 credit weight) and 8 graduate courses (0.50 unit weight per course) as follows: <ul style="list-style-type: none"> ▪ CHE 601 Theory and Application of Transport Phenomena ▪ CHE 602 Chemical Reactor Analysis ▪ 6 graduate level electives of which 3 must be CHE courses ● No more than 2 may be 500 level courses. ● No more than 1 may be a reading course. ● Graduate courses offered by the Faculty of Engineering are numbered as 600 or 700 series courses and are assigned a unit weight of 0.50, which means that they are one-term courses as defined in the Graduate Studies Academic Calendar. ● Only courses taken within five years prior to the completion of the MEng degree may be counted for credit towards a degree, unless a request for revalidation is granted. ● Students must achieve a: <ul style="list-style-type: none"> ○ Minimum cumulative average of 70%. ○ Minimum grade of 65% in each individual course. ○ Note: Probationary students may have specific grade requirements, which will be specified in their admission letter. ● Each student is responsible for monitoring their own academic records and must immediately notify the Graduate Coordinator of any inadequate grade or average. ● Students in the MEng in Chemical Engineering program may choose to pursue one of the following Graduate Specializations: <ol style="list-style-type: none"> 1. Polymer Science and Engineering 2. Process Systems Engineering ● A Graduate Specialization is a University credential that is recognized on the student's transcript but not on the diploma and is intended to reflect that a student has successfully completed a set of courses that together provide an in-depth study in the area of the Graduate Specialization. A student will only obtain the Graduate Specialization on their transcript if they have completed the requirements 	<ul style="list-style-type: none"> ● Courses <ul style="list-style-type: none"> ○ Students must complete CHE 600 Engineering and Research Methods, Ethics, Practice, and Law (0.25 credit weight) and 8 graduate courses (0.50 unit weight per course) as follows: <ul style="list-style-type: none"> ▪ CHE 601 Theory and Application of Transport Phenomena ▪ CHE 602 Chemical Reactor Analysis ▪ 6 graduate level electives of which 3 must be CHE courses ● No more than 2 may be 500 level courses. ● No more than 1 may be a reading course. ● Graduate courses offered by the Faculty of Engineering are numbered as 600 or 700 series courses and are assigned a unit weight of 0.50, which means that they are one-term courses as defined in the Graduate Studies Academic Calendar. ● Only courses taken within five years prior to the completion of the MEng degree may be counted for credit towards a degree, unless a request for revalidation is granted. ● Students must achieve a: <ul style="list-style-type: none"> ○ Minimum cumulative average of 70%. ○ Minimum grade of 65% in each individual course. ○ Note: Probationary students may have specific grade requirements, which will be specified in their admission letter. ● Each student is responsible for monitoring their own academic records and must immediately notify the Graduate Coordinator of any inadequate grade or average. ● Students in the MEng in Chemical Engineering program may choose to pursue one of the following Graduate Specializations: <ol style="list-style-type: none"> 1. <u>Biological Engineering</u> 2. Polymer Science and Engineering 3. Process Systems Engineering ● A Graduate Specialization is a University credential that is recognized on the student's transcript but not on the diploma and is intended to reflect that a student has successfully completed a set of courses that together provide an in-depth study in the area of the Graduate Specialization. A student will only obtain the Graduate

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<p>associated with the MEng degree and the requirements associated with the Graduate Specialization.</p> <ul style="list-style-type: none"> • All MEng Graduate Specializations in Chemical Engineering consist of a set of 4 graduate (0.50 weight) level courses and this set is comprised of a mix of compulsory and elective courses. Compulsory courses are those that are prescribed as part of the Graduate Specialization. Elective courses are those that are on a list of courses designated as electives for a given Graduate Specialization. The requirements for each of the Graduate Specializations are described below. <p>1. Graduate Specialization in Polymer Science and Engineering</p> <ul style="list-style-type: none"> • To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: <ul style="list-style-type: none"> ○ Compulsory courses: <ul style="list-style-type: none"> ▪ CHE 541 Introduction to Polymer Science and Properties ▪ CHE 621 Model Building and Response Surface Methodology ○ Elective courses (choose 2 from the following list): <ul style="list-style-type: none"> ▪ CHE 543 Polymer Production: Polymer Reaction Engineering ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations <p>2. Graduate Specialization in Process Systems Engineering</p> <ul style="list-style-type: none"> • To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: <ul style="list-style-type: none"> ○ Compulsory courses: <ul style="list-style-type: none"> ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ○ Elective courses (choose 2 from the following list): <ul style="list-style-type: none"> ▪ CHE 520 Process Flowsheet Analysis (currently CHE 500-Topic 4, to be renamed) 	<p>Specialization on their transcript if they have completed the requirements associated with the MEng degree and the requirements associated with the Graduate Specialization.</p> <ul style="list-style-type: none"> • All MEng Graduate Specializations in Chemical Engineering consist of a set of 4 graduate (0.50 weight) level courses and this set is comprised of a mix of compulsory and elective courses. Compulsory courses are those that are prescribed as part of the Graduate Specialization. Elective courses are those that are on a list of courses designated as electives for a given Graduate Specialization. The requirements for each of the Graduate Specializations are described below. <p><u>1. Graduate Specialization in Biological Engineering</u></p> <ul style="list-style-type: none"> • <u>To receive the Graduate Specialization in Biological Engineering, students must successfully complete 3 compulsory courses and 1 elective course:</u> <ul style="list-style-type: none"> ○ <u>Compulsory courses:</u> <ul style="list-style-type: none"> ▪ <u>CHE 562 Advanced Bioprocess Engineering</u> ▪ <u>CHE 660 Principles of Biochemical Engineering</u> ▪ <u>CHE 663 Bioseparations</u> ○ <u>Elective courses (choose 1 from the following list):</u> <ul style="list-style-type: none"> ▪ <u>CHE 561 Biomaterials & Biomedical Design</u> ▪ <u>CHE 564 Food Process Engineering</u> <p>2. Graduate Specialization in Polymer Science and Engineering</p> <ul style="list-style-type: none"> • To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: <ul style="list-style-type: none"> ○ Compulsory courses: <ul style="list-style-type: none"> ▪ CHE 541 Introduction to Polymer Science and Properties ▪ CHE 621 Model Building and Response Surface Methodology ○ Elective courses (choose 2 from the following list): <ul style="list-style-type: none"> ▪ CHE 543 Polymer Production: Polymer Reaction Engineering

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<ul style="list-style-type: none"> ▪ CHE 521 Process Optimization (currently CHE 500-Topic 5, to be renamed) ▪ CHE 522 Advanced Process Dynamics and Control <ul style="list-style-type: none"> • Link(s) to courses <ul style="list-style-type: none"> ○ Chemical Engineering (CHE) courses ○ Graduate course search • Seminar Attendance <ul style="list-style-type: none"> ○ Over the course of their degree program, all students must attend 12 seminars from departments and research institutions where Chemical Engineering faculty members have a membership. The Chemical Engineering seminars are documented in the Events section of the Chemical Engineering Department website. ○ Note: At Chemical Engineering seminars, attendance is documented. At other approved seminars, students must complete an attendance form and get it signed by the seminar organizer. Full instructions are available on the Department website. 	<ul style="list-style-type: none"> ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations <p>3. Graduate Specialization in Process Systems Engineering</p> <ul style="list-style-type: none"> • To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: <ul style="list-style-type: none"> ○ Compulsory courses: <ul style="list-style-type: none"> ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ○ Elective courses (choose 2 from the following list): <ul style="list-style-type: none"> ▪ CHE 520 Process Flowsheet Analysis (currently CHE 500-Topic 4, to be renamed) ▪ CHE 521 Process Optimization (currently CHE 500-Topic 5, to be renamed) ▪ CHE 522 Advanced Process Dynamics and Control <ul style="list-style-type: none"> • Link(s) to courses <ul style="list-style-type: none"> ○ Chemical Engineering (CHE) courses ○ Graduate course search • Seminar Attendance <ul style="list-style-type: none"> ○ Over the course of their degree program, all students must attend 12 seminars from departments and research institutions where Chemical Engineering faculty members have a membership. The Chemical Engineering seminars are documented in the Events section of the Chemical Engineering Department website. ○ Note: At Chemical Engineering seminars, attendance is documented. At other approved seminars, students must complete an attendance form and get it signed by the seminar organizer. Full instructions are available on the Department website.

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

Current students would be grandfathered under the current requirements.

Departmental approval date (mm/dd/yy):09/10/2019

Reviewed by GSPA (for GSPA use only) date (mm/dd/yy): 12/02/2019

Faculty approval date (mm/dd/yy):

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

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



Graduate Studies Program Revision Template

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

Faculty: Mathematics

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

Program contact name(s): Barbara Csima

Form completed by: Barbara Csima

Description of proposed changes:

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

The Department of Pure Mathematics is joining the Quantum Information collaborative program and is adding a PhD in Pure Mathematics - Quantum Information program.

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

Rationale for change(s):

The Quantum Information (QI) collaborative program is currently offered by numerous departments at UW. We now have Institute for Quantum Computing (IQC) – affiliated faculty in the Pure Mathematics department who would like for their students who are interested in QI to be able to participate in the program. We have graduate students and prospective graduate students who are interested in pure mathematics as it relates to quantum information, and who have expressed interest in enrolling in this program when it becomes available, so we expect there will be demand for the program, and that it will help with recruitment.

Proposed effective date: Term: Spring Year: 2020

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

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

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<p><i>No current content.</i></p>	<p><u>Doctor of Philosophy (PhD) in Pure Mathematics - Quantum Information</u></p> <p><u>Program information</u></p> <ul style="list-style-type: none"> • <u>Admit term(s)</u> <ul style="list-style-type: none"> ○ <u>Fall</u> ○ <u>Winter</u> ○ <u>Spring</u>

Current Graduate Studies Academic Calendar content:

Proposed Graduate Studies Academic Calendar content:

- **Delivery mode**
 - On-campus

- **Program type**
 - Collaborative
 - Doctoral
 - Research

- **Registration option(s)**
 - Full-time
 - Part-time

- **Study option(s)**
 - Thesis

Admission requirements

- **Minimum requirements**
 - A Master's degree (or equivalent) in Mathematics with at least a 78% standing. Exceptions may be made for students with an Honours Bachelor degree who demonstrate a very high level of background preparation and research potential.
 - A one-page personal statement.

- **Application materials**
 - Supplementary information form
 - Transcript(s)

- **References**
 - Number of references: 3
 - Type of references: at least 2 academic

- **English language proficiency (ELP) (if applicable)**

Degree requirements

Thesis option:

- **Graduate Academic Integrity Module (Graduate AIM)**

- **Courses**
 - The program requires a minimum of 4 graduate courses, including the 2 Quantum Information core courses, with an average of at least 70% (with unit weights equal to 0.50) for those

Current Graduate Studies Academic Calendar content:

Proposed Graduate Studies Academic Calendar content:

entering the PhD program with a Master's degree. At least 3 of the 4 required courses must be PMATH graduate courses numbered in the 800's and 900's, and at least 1 of the 4 required courses must be a QIC graduate course (note that cross-listed courses, such as PMATH 871/QIC 710, are regarded as both PMATH and QIC courses). If the 4th course is not a PMATH or QIC course it must be approved by the Pure Mathematics Graduate Committee. None of the 4 required courses can be graduate courses numbered in the 600s or reading courses. Up to 3 course credits may be granted by the Graduate Committee for work completed towards the PhD degree at another institution provided that the relevance of the previous work to the student's proposed program is clearly established.

- Quantum Information core courses:
 - QIC 710 Quantum Information Processing (equivalent to PMATH 871 Quantum Information Processing)
 - QIC 750 Implementation of Quantum Information Processing
- If students have credit for a course deemed equivalent to a particular core QIC course by the IQC Curriculum Committee, then that part of the core requirement may be waived, but the minimum number of required courses will remain 4.
- Students entering the program with a Bachelor's degree normally must also satisfy the course requirements of a Master of Mathematics (MMath) degree in addition to those of the PhD program. The number and nature of such courses shall be specified at the time of admission, or early on in the program.

- **Link(s) to courses**
 - Pure Mathematics (PMATH) courses
 - Quantum Information (QIC) courses
 - Graduate course search

- **PhD Lecturing Requirement**

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	<ul style="list-style-type: none"> ○ <u>Regular participation in at least 1 departmental seminar is expected and the student must present at least 2 talks in a department seminar.</u> • <u>PhD Quantum Information Seminar</u> <ul style="list-style-type: none"> ○ <u>Students must successfully complete a seminar milestone consisting of presenting 1 talk in an Institute for Quantum Computing (IQC) seminar, and presenting 1 seminar talk on a Quantum Information (QI) topic. If appropriate, lectures given as part of the PhD Lecturing Requirement may also be used to satisfy the seminar requirement.</u> • <u>PhD Comprehensive Examination</u> <ul style="list-style-type: none"> ○ <u>Students in the PhD in Pure Mathematics program are required to meet the following requirements:</u> ○ <u>Satisfactory performance in 2 written Comprehensive Examinations:</u> <ul style="list-style-type: none"> ▪ <u>1 in algebra</u> ▪ <u>1 in analysis and topology</u> ○ <u>Each exam is set and assessed by two examiners, with oversight from the Graduate Committee. Members of the Graduate Committee are allowed to serve as examiners. The outcome of each exam is determined by the Graduate Committee.</u> ○ <u>The syllabus is based on the material covered in the University of Waterloo's third and fourth year undergraduate courses. The Graduate Committee offers these written exams annually.</u> ○ <u>Students must attempt both exams within one year of their registration in the PhD program, and both exams must be successfully completed within seven terms.</u> • <u>PhD Thesis</u> <ul style="list-style-type: none"> ○ <u>Students must complete a thesis embodying the results of original research. This is the most important requirement! The thesis should be on a topic related to quantum information. The thesis must be of a standard that warrants publication in the research literature of the field. The thesis must be acceptable to a committee approved</u>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	<u>by the Graduate Committee consisting of the student's supervisor and four other professors; one of whom must be from another department, and one must be an independent external examiner familiar with the student's research field. The student is required to defend the thesis at an oral examination.</u>

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

Students currently in the PhD in Pure Mathematics program working in quantum information may be given the option to transfer to the PhD in Pure Mathematics – QI program.

- Department/School approval date** (mm/dd/yy):
- Reviewed by GSPA** (for GSPA use only) date (mm/dd/yy): 12/11/2019
- Faculty approval date** (mm/dd/yy):
- Senate Graduate & Research Council (SGRC) approval date** (mm/dd/yy):
- Senate approval date** (mm/dd/yy) (if applicable):



Graduate Studies Program Revision Template

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

Faculty: Mathematics

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

Program contact name(s): Barbara Csima

Form completed by: Barbara Csima

Description of proposed changes:

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

The Department of Pure Mathematics is joining the Quantum Information collaborative program and is adding a MMath in Pure Mathematics - Quantum Information program.

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

Rationale for change(s):

The Quantum Information (QI) collaborative program is currently offered by numerous departments at UW. We now have Institute for Quantum Computing (IQC) – affiliated faculty in the Pure Mathematics Department who would like for their students who are interested in QI to be able to participate in the program. We have graduate students and prospective graduate students who are interested in pure mathematics as it relates to quantum information, and who have expressed interest in enrolling in this program when it becomes available, so we expect there will be demand for the program, and that it will help with recruitment.

Proposed effective date: Term: Spring Year: 2020

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

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

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
<p><i>No current content.</i></p>	<p><u>Master of Mathematics (MMath) in Pure Mathematics - Quantum Information</u></p> <p><u>Program information</u></p> <ul style="list-style-type: none"> • <u>Admit term(s)</u> <ul style="list-style-type: none"> ○ <u>Fall</u> ○ <u>Winter</u>

Current Graduate Studies Academic Calendar content:

Proposed Graduate Studies Academic Calendar content:

- **Delivery mode**
 - On-campus
- **Program type**
 - Collaborative
 - Master's
 - Research
- **Registration option(s)**
 - Full-time
 - Part-time
- **Study option(s)**
 - Thesis
 - Master's Research Paper

Admission requirements

- **Minimum requirements**
 - An Honours Bachelor's degree (or equivalent) in Mathematics with at least a 78% standing.
- **Application materials**
 - Supplementary information form
 - Transcript(s)
- **References**
 - Number of references: 3
 - Type of references: at least 2 academic
- **English language proficiency (ELP) (if applicable)**

Degree requirements

Thesis option:

- **Graduate Academic Integrity Module (Graduate AIM)**
- **Courses**
 - The Thesis option requires a minimum of 4 graduate course credits, including the 2 Quantum Information core courses, with an average of at least 70% (with unit weights equal to 0.50 each). At least 2 of the courses must be PMATH graduate courses numbered in the 800's and 900's, and at least 2 of the courses must be QIC graduate courses (note that cross-listed courses,

Current Graduate Studies Academic Calendar content:

Proposed Graduate Studies Academic Calendar content:

such as PMATH 871/QIC 710, are regarded as both PMATH and QIC courses). The other 2 courses can include at most 1 PMATH course numbered in the 600s and at most 1 graduate course from outside Pure Mathematics or Quantum Information. The selection of courses normally requires the approval of the student's graduate advisor. In order for a reading course to count as 1 of the 4 required courses, approval must be obtained from the Departmental Graduate Committee. A reading course consisting of work done by a student in the immediate preparation for writing a thesis would not normally be counted as 1 of the 4 required courses.

- Quantum Information core courses:
 - QIC 710 Quantum Information Processing (equivalent to PMATH 871 Quantum Information Processing)
 - QIC 750 Implementation of Quantum Information Processing
- If students have credit for a course deemed equivalent to a particular core QIC course by the IQC Curriculum Committee, then that part of the core requirement may be waived, but the minimum number of required courses will remain 4.

- **Link(s) to courses**
 - Pure Mathematics (PMATH) courses
 - Quantum Information (QIC) courses
 - Graduate course search

- **Master's Seminar**
 - Regular participation in a departmental seminar is required.

- **Master's Thesis**
 - The thesis should be on a topic related to quantum information and must be acceptable to a committee approved by the Departmental Graduate Committee. It will consist of the student's supervisor and two other readers who will normally be faculty members at Waterloo. At least one of the two other readers must be a member of the Pure Mathematics

Current Graduate Studies Academic Calendar content:

Proposed Graduate Studies Academic Calendar content:

Department. The nature and length of a Master's thesis can vary greatly. However, a typical thesis is roughly 50-100 typed pages. The thesis should be a synthesis of some research papers or monographs, and may also contain some original work. The student will be expected to give a talk on their thesis.

Master's Research Paper option:

- **Graduate Academic Integrity Module (Graduate AIM)**
- **Courses**
 - The Master's Research Paper option requires a minimum of 6 graduate course credits, including the 2 Quantum Information core courses, with an average of at least 70% (with unit weights equal to 0.50). At least 4 courses must be PMATH courses, and at least 3 of the courses must be QIC graduate courses (note that cross-listed courses, such as PMATH 871/QIC 710, are regarded as both PMATH and QIC courses). At least 2 of the courses must be PMATH graduate courses numbered in the 800's and 900's; it is strongly recommended that at least 3 courses be such. At most 2 courses can be PMATH courses numbered in the 600s. In order for a reading course to count as 1 of the 6 required courses, approval must be obtained from the Departmental Graduate Committee. A reading course consisting of work done by a student in the immediate preparation for writing the research paper would not normally be counted as 1 of the 6 required courses. The selection of courses normally requires the approval of the student's graduate advisor.
 - Quantum Information core courses:
 - QIC 710 Quantum Information Processing (equivalent to PMATH 871 Quantum Information Processing)
 - QIC 750 Implementation of Quantum Information Processing
 - If students have credit for a course

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	<p><u>deemed equivalent to a particular core QIC course by the IQC Curriculum Committee, then that part of the core requirement may be waived, but the minimum number of required courses will remain 6.</u></p> <ul style="list-style-type: none"> • <u>Link(s) to courses</u> <ul style="list-style-type: none"> ○ <u>Pure Mathematics (PMATH) courses</u> ○ <u>Quantum Information (QIC) courses</u> ○ <u>Graduate course search</u> • <u>Master's Research Paper</u> <ul style="list-style-type: none"> ○ <u>The Master's Research Paper should be on a topic related to quantum information and will normally be completed in the Spring term (May - August) for students who entered the program in the previous Fall term. A typical research paper is roughly 25-30 typed pages.</u>

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

Students currently registered in the MMath in Pure Mathematics program working in quantum information may be given the option to transfer to the MMath in Pure Mathematics – QI program.

Department/School approval date (mm/dd/yy):

Reviewed by GSPA (for GSPA use only) date (mm/dd/yy): 12/11/2019

Faculty approval date (mm/dd/yy):

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

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

February 24, 2020

TO: Kathy Winter, Privacy Officer and Assistant University Secretary,
Senate Graduate and Research Council

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

RE: Graduate Studies Academic Calendar changes

Items for approval:

- 1) University responsibilities regarding supervisory relationships

Description and rationale for proposed changes:

University responsibilities regarding supervisory relationships have been developed to provide better clarity of expectations for students and faculty as to what is expected when a relationship between a student and a supervisor ends.

Proposed effective date: Term: Spring Year: 2020

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/general-information-and-regulations>

Proposed Graduate Studies Academic Calendar content:

University responsibilities regarding supervisory relationships

In instances when a graduate student is progressing satisfactorily but when the relationship between the student and their supervisor becomes untenable, it is important that there is clarity on expectations and responsibilities for both the student and the supervisor moving forward. This section provides direction to this end.

The situation in which a student is not progressing satisfactorily is described in the [Guidelines for evaluating and providing feedback on graduate student progress in PhD and research Masters programs](#).

Note that a loss of funding is not normally a valid reason for a faculty member to end a supervisory relationship. In those cases, it is the responsibility of the supervisor, the department/school or program, and the Faculty to secure funding to support the student to the end of the funding commitment as articulated in the student's offer of admission or to the University-mandated program time limits. In some instances, funding for students is provided at the Faculty level.

A. In cases where the supervisor wishes to discontinue the relationship:

The supervisor will have provided the student with ongoing, constructive feedback such that the student has had an opportunity to react to and address the supervisor's concerns. Normally, a student should have a minimum of two terms with the supervisor in order to evaluate the goodness of fit between student and supervisor before a final determination is made on discontinuing the relationship.

Proposed Graduate Studies Academic Calendar content:

When the supervisor starts the process of ending the supervisory relationship, the supervisor shall communicate in writing to the student the rationale for the discontinuation. The intention of this communication is for the student to have the opportunity to meaningfully reflect on the situation and consider how this may influence future choices.

If the student wishes to continue at the University of Waterloo, the University makes the following commitments in support of the student:

- i. The previous supervisor will not take actions that negatively influence the likelihood of the student finding a new supervisor;
- ii. The supervisor, department/school or Faculty will provide funding at the University minimum levels to the student for up to two terms while the student seeks a new supervisor (within or outside the Faculty); these will be aligned with important University dates.
- iii. The Graduate Officer in the student's home department/school or program will:
 - a. assist the student in developing materials (CV, research statement, etc.) that can be presented to potential new supervisors;
 - b. contact academic colleagues and arrange meetings between potential supervisors and the student;
 - c. serve as a temporary supervisor (the meaning of which is to sign forms, ensure courses are correct, but not provide academic input) until a new supervisor is found or the student's program ends.
- iv. The department/school or Faculty will communicate in writing the date by which a new supervisor must be in place and the implications of not meeting this date. Typically, students who are unable to obtain a new supervisor will be given the opportunity to voluntarily withdraw from their program. In cases where the student opts not to voluntarily withdraw, the department/school or program may reach a decision of "required to withdraw".

B. In cases where a student wishes to discontinue the relationship:

There are numerous reasons as to why a student may want to discontinue their relationship with their supervisor. Should there be reasons that relate to University Policy, options through those avenues should be shared with the student by the Graduate Officer. However, the University recognizes that sometimes there is not a good fit between the student and their supervisor. Hence, the student should have the opportunity to find another supervisor to continue their graduate studies at the University of Waterloo.

The Graduate Officer in the student's home department/school or program will have actively been engaged with the student and the supervisor in an effort to sustain the relationship. When those efforts are deemed to not have been successful, and the student wishes to stay at the University of Waterloo, the University makes the following commitments in support of the student:

- i. The previous supervisor, faculty members, and staff in the student's home department/school or program will not take actions that negatively influence the likelihood of the student finding a new supervisor;
- ii. The department/school or Faculty will provide funding at the University minimum level for a maximum of one term while the student seeks a new supervisor (within or outside the Faculty);
- iii. The Graduate Officer in the student's home department/school or program will serve as a temporary supervisor during this period [see A. iii (c), in the previous section].

Proposed Graduate Studies Academic Calendar content:

- iv. The department/school or Faculty will communicate in writing the date by which a new supervisor must be in place and the implications of not meeting this date. Typically, students who are unable to find a new supervisor will be given the opportunity to voluntarily withdraw from their program. In cases where the student opts not to voluntarily withdraw, the department/school or program may reach a decision of “required to withdraw”.

Graduate Operations Committee approval date (mm/dd/yy): 02/18/2020

University of Waterloo
UNIVERSITY APPOINTMENT REVIEW COMMITTEE
Report to Senate
20 April 2020

FOR INFORMATION

This report is provided under Policy 76 – Faculty Appointments. From September 2018 to August 2019 (numbers in brackets are from 2017-18), UARC reviewed a total of 87 (102) proposals for regular faculty appointments.

Of the files reviewed 31 (27) females, 56 (73) males, 0 of unknown gender (0), 9 (7) were tenured, 54 (59) were for probationary, and 24 (36) were for definite-term appointments.

More detail is provided in the table contained within this report. The percentage of females at the rank of assistant research professor, lecturer, assistant professor, associate professor and professor were: 0% (33.3%), 52.4% (41.4%), 36.5% (20.3%), 0% (28.6%) and 33.3% (0%) respectively. For comparison purposes, the total number of proposals reviewed in recent years was 58 (2009-10), 79 (2010-11), 87 (2011-12), 68 (2012-13), 70 (2013-14), 85 (2014-15), 69 (2015-16), 90 (2016-17), 102 (2017-18) and 87 (2018-19).

Length of the Review Process

Appointment proposals from academic units and faculties generally were very good, and department chairs/schools directors have been very helpful in providing any additional information requested. Advance notice of proposals continues to be important to ensure speedy turnaround. Policy 76 specifies five working days for the review process. During the past year, UARC members were able to complete most reviews within five working days unless there was some missing information and discussions with the chair/director or dean were required.

Administration

Administrative information concerning UARC can be found at:
<https://uwaterloo.ca/secretariat/committees-and-councils/university-appointments-review-committee>. Documents include: Summary of Recruiting Efforts for UW Faculty positions form, which chairs/directors are required to complete; Overview of Chair's Memo to the Dean; Conflict of Interest in Hiring Committees; UARC Presentation 2018; link to VPAP Forms and Templates.

UARC Membership

AHS: Clark Dickerson (until May 2020), Heather Mair (until May 2021)
ARTS: Anna Esselment, Doreen Fraser (until May 2021)
ENG: Catherine Rosenberg (until May 2021), Marios Ioannidis (until May 2022)
ENV: Johanna Wandel, Prateep Nayak (until May 2021)
MATH: Peter van Beek (until May 2020), Penny Haxell (until May 2022)
SCI: Tadeusz Gorecki (until December 2019), Brian Dixon (until May 2022)
Flora Ng (ENG) (Chair until June 2019), Gerry Schneider (ENG) (Chair until May 2022)

Summary of Proposals for Regular Faculty Appointments for Two Years or More

Reviewed by UARC

September 2018 – August 2019

Faculty	Files	Residency				Gender			Appointment Type									Professorial Rank															Results												
		CDN	PERM	FOREIGN	UNKNOWN	Female	Male	Unknown	Tenure			Probationary			Definite Term			Lecturer			Assistant Professor			Associate Professor			Full Professor			Assistant Research Professor			Offers	Accepted	Declined	Pending									
									F	M	U	F	M	U	F	M	U	F	M	U	F	M	U	F	M	U	F	M	U	F	M	U													
AHS	6	4	1	0	1	3	3	0	0	0	0	4	2	2	0	2	1	1	0	2	1	1	0	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	6	5	1	0			
ARTS	13	10	2	1	0	6	7	0	2	1	1	0	10	4	6	0	1	1	0	0	1	1	0	0	10	4	6	0	0	0	0	0	2	1	1	0	0	0	0	0	13	13	0	0	
ENG	14	8	0	6	0	4	10	0	1	0	1	0	9	2	7	0	4	2	2	0	4	2	2	0	7	2	5	0	2	0	2	0	1	0	1	0	0	0	0	0	14	12	1	1	
ENV	8	5	0	3	0	3	5	0	1	1	0	0	6	2	4	0	1	0	1	0	0	0	0	0	7	2	5	0	0	0	0	0	1	1	0	0	0	0	0	0	0	8	8	0	0
MATH	31	14	3	14	0	7	24	0	3	0	3	0	18	4	14	0	10	3	7	0	10	3	7	0	18	5	13	0	2	0	2	0	1	0	1	0	0	0	0	0	0	31	18	13	0
SCI	15	7	3	5	0	8	7	0	2	0	2	0	7	4	3	0	6	4	2	0	4	4	0	0	6	4	2	0	3	0	3	0	1	0	1	0	1	0	1	0	15	12	3	0	
TOTAL	87	48	9	29	1	31	56	0	9	2	7	0	54	18	36	0	24	11	13	0	21	11	10	0	52	19	33	0	7	0	7	0	6	2	4	0	1	0	1	0	87	68	18	1	

Of the 68 who accepted offers: 25 (37%) were female, 44 (64%) were male, 0 were of unknown gender (0%). Of the 18 who declined offers: 5 were female (27%), 13 were male (72%), 0 were of unknown gender (0%). There is 1 male offer still pending.

Gerry Schneider
Chair, UARC