UNIVERSITY OF WATERLOO
SENATE GRADUATE & RESEARCH COUNCIL
NOTICE OF MEETING

DATE: Monday 13 February 2023 Chair – J. Casello
TIME: 10:30 a.m. – 12:00 noon
PLACE: NH 3318/3308

AGENDA

Item	Action
Declarations of Conflict of Interest	
a. Excerpt from Bylaw 1, section 8*	Information
CONSENT AGENDA	
Motion: To approve or receive for information by consent, items 1-3 below	
1. Minutes of 9 January 2023*	Decision (SGRC)
2. Curricular Submissions	
a. Engineering* (Siva Sivoththaman)	Decision(SGRC)
b. Health* (Brian Laird)	Decision(SGRC)
3. Graduate Awards* (Simm)	
a. OAA Award for Exceptional Leadership through Design Excellence (trust)	Decision (SGRC)
REGULAR AGENDA	
4. Business Arising from the Minutes	Information
5. Co-chairs' Remarks	Information
6. Graduate Studies – Academic Calendar changes 2023/24* (Coghlin)	SEN-Regular
a. Class Components Definitions	
b. Course Delivery Modes	
7. New Program: Master of Future Cities (MFC)*(Leia Minaker)	SEN-Regular
8. Potential amendments to the annual meeting schedule of Senate*	Discussion/Information
9. Curricular Submissions	
a. Engineering* (Siva Sivoththaman)	SEN-Regular 2c,d
b. Health* (Brian Laird)	SEN-Regular 1.3.1
10. Graduate Studies and Postdoctoral Affairs Visioning Exercise-Continued* (Casello)	Discussion
11. Research Data Management Institutional Strategy* (Ian Milligan)	Discussion/Information
12. Next Meeting: 6 March 2023 from 10:30 a.m. - 12 noon; NH3318	Information

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

5 February 2023

Kathy Winter, PhD, CPsych
Assistant University Secretary

Excerpt from Senate Bylaw 1

8. Declarations of conflict of interest

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

University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
Minutes of the 9 January 2023 Meeting
[in agenda order]
Needles Hall 3318/3308

Present: Derek Armitage, Ramona Bobocel, Jeff Casello, Charmaine Dean, Rob de Loe, Maureen Drysdale, Bernie Duncker, Anna Esselment, Aiman Fatima, Bertrand Guenin, Alison Hitchens, Ryan Johnson, Julie Joza, Brian Laird, William McIlroy, Ian Milligan, Liz Nilsen, Jennifer Reid, Martin Ross, Manoj Sachdev, Marianne Simm, Siva Sivoththaman, Mike Szarka, Shirley Tang, Kathy Winter (secretary)

Resources: Carrie MacKinnon, Amanada McKenzie

Guests: Richard Wikkerink

Regrets: Zerihun Kinate, Anita Layton, Julian Surdi*, Shawn Wettig

Organization of Meeting: Charmaine Dean, co-chair of the council, took the chair, and Kathy Winter acted as secretary. The secretary advised that due notice of the meeting had been given, a quorum was present, and the meeting was properly constituted.

DECLARATIONS OF CONFLICT OF INTEREST
No conflicts of interest were declared.

CONSENT AGENDA
Council heard a motion to approve or receive for information the items of the consent agenda. Hitchens and Laird. Carried.

1. MINUTES OF 12 DECEMBER 2022
Council approved the minutes of the meeting as distributed.

2. RESEARCH ETHICS
Council approved a membership update to the Human Research Ethics Board.

3. GRADUATE AWARDS
Council received items a for information.

REGULAR AGENDA
4. BUSINESS ARISING FROM THE MINUTES
There was no business arising.

5. CO-CHAIRS' REMARKS
Casello updated council: (a) Policy 30, Employment of Graduate Student Teaching Assistants - was approved by Provost and will go to 16 January 2023 Senate for information; thank you to drafting committee members, including Reid; Casello will advise as to consistent messaging on the policy roll out across faculties, and (b) adjudication for postdoctoral funding competitions has begun (117 applications for the 3 competitions); evaluation committee soon to convene and a representative from Engineering still needed. Dean outlined 3 processes under Duncker's portfolio (i.e., senior awards/graduate teaching and research, core facilities and commitments to being a more sustainable institution, and core partnerships and commercialization) and stated plans to keep this council routinely apprised.

6. GRADUATE STUDIES AND POSTDOCTORAL AFFAIRS VISIONING EXERCISE

Speaking to his presentation, *Towards a proposed vision: Graduate studies at Waterloo*, as circulated, Casello outlined: Waterloo's necessary and aspirational vision ('the best and most sought-after") for graduate studies and graduate students, the importance of facilitating and catalyzing student-centric pathways in the creation of a cohesive framework of excellence; and the requirement for deliberate collaboration and coordination amongst campus stakeholders. Casello outlined the first 2 of 6 actions toward attainment: (1) attract, recruit, and confirm exceptional students and scholars equitable, diversely, and inclusively; (2) facilitate academic, personal, and professional student-centered pathways through unique suites of options, interdisciplinarity, and experiential opportunities. In discussion: importance of continued graduate student input (GSA, GSRC, focus groups) in establishing and realizing this vision; leveraging alumni strength and impacts; building brand identity within faculties; connecting vision to Waterloo Strategic Plan, Waterloo at 100; funding (impacts of external funding and revenue neutral course-based programs); supervisor resources, capacity, expectations, and identity through impactful graduate students; garnering meaningful and effective metrics through new and existing data. Casello's presentation to be continued 13 February 2023 SGRC (slide 13).

7. OTHER BUSINESS

There was no other business.

8. NEXT MEETING

The next meeting will be held Monday 13 February 2023 from 10:30 a.m. to 12 noon in NH3318.

9 January 2023

Kathy Winter, PhD, CPsych,
Assistant University Secretary

UNIVERSITY OF WATERLOO
FACULTY OF ENGINEERING

M E M O

TO: Kathy Winter, Assistant University Secretary & Privacy Officer Secretariat

FROM: S. Sivoththaman, Associate Dean, Graduate Studies, Faculty of Engineering

RE: Senate Graduate and Research Council

DATE: January 30, 2023

Please place the following motions forward for approval at the next meeting of the SGRC. These changes were approved by the EFC on January 17, 2023.

Items for Approval:

1. The department of Electrical and Computer Engineering would like to make the following calendar changes:

    a. ECE PhD Admissions Average Requirements Update
    b. Revision to course ECE 649

Rationale for Request:

a. The 80% minimum is a better reflection of the reality of PhD admissions in ECE and coincides with the admission averages for most of the Engineering departments in the Faculty of Engineering. This change may also encourage more applicants to apply, as 80% could be more attainable than 83%. Historical grade data in ECE shows that non-standard admits with entrance averages below 83% have performed almost as well as standard admits in the program.
b. This course is currently labeled as a "LEC" meet type, but should be a "PRJ" meet type, similar to ECE 699.

2. The department of **Chemical Engineering** would like to make the following calendar changes:

These items for consideration on SGRC Regular Agenda

a. Adding new course CHE 650
b. Adding new course CHE 651
c. Adding a direct entry MEng co-op program
d. A new MEng specialization- Entrepreneurship
e. PhD Program changes

i. Adding a PhD Advisory Committee Meeting and Report milestone to the degree requirements
ii. Updating the PhD Comprehensive Examination description and requirements

Rationale for Request:

a. This course is a key component of the CHE MEng co-op program which is in line with the departmental, Faculty, and University Work Integrated Learning (WIL) goals.
b. This course is a key component of the CHE MEng Entrepreneurship specialization which is both aligned with the long-term vision of the Department of Chemical Engineering, the Conrad School of Entrepreneurship and Business, and the University.

These items for consideration on SGRC Regular Agenda

c. The MEng in Chemical Engineering Co-op program is in line with the departmental, Faculty, and WIL goals. It will be a competitive program and is in line with recommendations of an external review from 2017 as well as feedback from past MEng students.
d. This is in line with the long-term vision of the department of Chemical Engineering, the Conrad School of Entrepreneurship and Business, and the University. The majority of past MEng students have taken 2-3 BE courses and have provided positive feedback to the department regarding their utility and the additional breadth in the training. Providing formal curriculum which focuses on the entrepreneurship leverages MEng student interest focuses it on a strategic area which needs to be enhanced in the discipline, entrepreneurship.
e. i) The PhD Advisory Committee Meeting and Report will provide increased support to students and their supervisors. Performance feedback will be provided to students prior to the PhD comprehensive examination for direct admit students and between the PhD comprehensive examination and defence for direct and standard admit students. Formal feedback will be provided from faculty other than the supervisor(s)
ii) To be consistent with the University and Faculty of Engineering-level PhD Comprehensive Examination minimum requirements.

3. The department of **Systems Design Engineering** would like to make the following calendar changes:

a. Adding new course SYDE 663 which will be cross listed with ENGL 701
b. Expand the elective course list to include courses from the Faculties of Engineering, Mathematics, Health, Environment, and Science for:
    i. MASc and MASc- Aero
    ii. PhD and PhD- Aero
c. Update seminar requirements for:
    i. MASc, MASc- Nano, MASc- Aero
    ii. PhD, PhD- Nano, and PhD- Aero
d. Update seminar attendance requirements for:
    i. MASc, MASc- Nano, MASc- Aero
    ii. PhD, PhD- Nano, and PhD- Aero
e. Revise Length of program information for MASc, MASc- Nano, and MASc- Aero

f. Removal of the restriction on integrated thesis from the GSAC for PhD, PhD Nano, and PhD-Aero
g. New Milestone for PhD students to meet with advisory committee at least once per year (pages

Rationale for Request:

a. The project-based design of this course encourages students to intervene directly in the tech ecology by promoting responsible design practices across disciplines. To this end, the course has historically supported collaboration between students in ENGL and SYDE. The proposed cross-listing will help solidify the course's interdisciplinary focus and facilitate knowledge transfer between students who have similar interests in responsible design but who come from very different disciplinary backgrounds. The course can potentially serve as a model for how Arts and STEM disciplines can work together to promote responsible innovation
b. Systems Design Engineering is a department which prides itself on the interdisciplinary and diverse nature of its researchers. As such, it is appropriate to allow our graduate students to pick from a larger suite of courses to meet their elective degree requirements so that their course selection can be better tailored to their individual research plans.
c. The updating of the seminar requirement is required to more clearly articulate the requirements for the student and update the practices of the Department which allow for seminars to occur outside of the Systems Design Engineering Graduate Colloquium.
d. The updating of the seminar attendance requirement is required to remove the reference to Seminar Attendance Certificates which are not currently in use by the Department.
e. The length of program information is being revised since the current duration listed in the GSAC is inaccurate as it references the length of the MEng in Systems Design Engineering program.
f. Removing the restriction on integrated theses is in line with the University and Faculty of Engineering's guidelines on theses with co-authored content.
g. The addition of a requirement for PhD students to meet with their Advisory Committee at least once per year is an important part of monitoring student academic progression and providing students with timely feedback on their thesis writing and research progress.

SS/em

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: Engineering

Program: 1) Doctor of Philosophy (PhD) in Electrical and Computer Engineering

2) Doctor of Philosophy (PhD) in Electrical and Computer Engineering - Nanotechnology

3) Doctor of Philosophy (PhD) in Electrical and Computer Engineering - Quantum Information

Program contact name(s): Chris Nielsen, Jessica Rossi

Form completed by: Jessica Rossi

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

Lowering the minimum average admission requirement for the PhD in ECE programs from 83% to 80%.

Is this a major modification to the program? No

Rationale for change(s):

The 80% minimum is a better reflection of the reality of PhD admissions in ECE and coincides with the admission averages for most of the Engineering departments in the Faculty of Engineering. This change may also encourage more applicants to apply, as 80% could be more attainable than 83%. Historical grade data in ECE shows that non-standard admits with entrance averages below 83% have performed almost as well as standard admits in the program.

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-electrical-and-computer-engineering/doctor-philosophy-phd-electrical-and-computer-engineering

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-electrical-and-computer-engineering/doctor-philosophy-phd-electrical-and-computer-engineering-nanotechnology

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-electrical-and-computer-engineering/doctor-philosophy-phd-electrical-and-computer-engineering-quantum-information

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

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

• **Minimum requirements**
  ○ Admission to the program is based upon the student's academic record and evidence of ability to pursue independent research.
  ○ Normally an overall standing equivalent to ~~83%~~ in either a relevant thesis-based Master's degree or a University of Waterloo Master of Engineering (MEng) degree that includes a completed ECE 699 Master of Engineering Project course.
  ○ At the time of admission, each student must have a faculty supervisor who has endorsed the recommendation for admission.
	• **Minimum requirements**
	  ○ Admission to the program is based upon the student's academic record and evidence of ability to pursue independent research.
	  ○ Normally an overall standing equivalent to <u>80%</u> in either a relevant thesis-based Master's degree or a University of Waterloo Master of Engineering (MEng) degree that includes a completed ECE 699 Master of Engineering Project course.
	  ○ At the time of admission, each student must have a faculty supervisor who has endorsed the recommendation for admission.

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

Students currently registered in the programs will not be impacted by this change, as they will have already been admitted into the programs. This will only affect potential applicants.

Department/School approval date (mm/dd/yy): 10/20/2022
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/07/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Engineering

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☒ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

The meet type/course component is being changed from Lecture (LEC) to Project (PRJ).

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

Course subject code: ECE

Course number: 649

Course ID: 016276

Course title (max. 100 characters including spaces): Nanoelectronic Circuits and Systems Project

Course short title (max. 30 characters including spaces): Nano Circ & Sys Projct

Grading basis: Numerical

Course credit weight: 1.00

Course consent required: Department

Course description: This is a project course, designed exclusively for MEng students completing the Nanoelectronic Circuits and Systems specialization. Students will carry out a research project over one academic

term, under the direct supervision of an ECE faculty member from the associated research area. At the end of the term, a written Project Report has to be submitted, which will be evaluated and marked by the Supervisor.

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

Primary meet type: Project

Delivery mode: On-campus

Requisites: Antireq: ECE 699 and ECE 740 Topic 5

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with: none

Rationale for request:

This course is currently labeled as a "LEC" meet type, but should be a "PRJ" meet type, similar to ECE 699.

Form completed by: Jessica Rossi
Department/School approval date (mm/dd/yy): 11/17/2022
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

UNIVERSITY OF WATERLOO

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Engineering

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: CHE

Course number: 650

Course ID:

Course title (max. 100 characters including spaces): Engineering Work-term Experience Report

Course short title (max. 30 characters including spaces): Eng Workterm Experience Report

Grading basis: Credit/No Credit

Course credit weight: 0.25

Course consent required: Not required

Course description: A structured report articulating the student's co-operative work-term experience in the context of the professional practice requirements for engineering licensure.

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

Primary meet type: Project

Delivery mode: Only offered online

Requisites: CHE MEng Coop Students Only

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

This course is a key component of the CHE MEng co-op program which is itself in line with departmental, Faculty, and University Work Integrated Learning (WIL) goals.

Form completed by: Nasser Mohieddin Abukhdeir
Department/School approval date 09/12/2022)
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/15/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

UNIVERSITY OF WATERLOO

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Engineering

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: CHE

Course number: 651

Course ID:

Course title (max. 100 characters including spaces): Technology Entrepreneurship Project

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Department

Course description: Individual student project of technical and entrepreneurial relevance. Student develops a project proposal, a project plan, performs a technical analysis, and assesses engineering requirements (safety,

regulatory, sustainability and professional ethics). Submission of a written technical report and oral presentation summarizing project outcomes.

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

Primary meet type: Project

Delivery mode: On-campus

Requisites: Coreq: BE 606

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

This course is a key component of the CHE MEng Entrepreneurship specialization, which is both aligned with the long-term vision of the Department of Chemical Engineering, the Conrad School of Entrepreneurship and Business, and the University.

Form completed by: Nasser Mohieddin Abukhdeir
Department/School approval date (mm/dd/yy): 09/12/2022
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/15/2022
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

UNIVERSITY OF WATERLOO

Graduate Studies
Program Revision Template

This item is for consideration on SGRC Regular Agenda

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: Engineering

Program: Master of Engineering (MEng) in Chemical Engineering - Co-operative Program

Program contact name(s): Nasser Mohieddin Abukhdeir, Judy Caron

Form completed by: Nasser Mohieddin Abukhdeir

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

Adding a direct entry Co-operative program/option to the MEng in Chemical Engineering program.

Is this a major modification to the program? Yes

Rationale for change(s):

The MEng in Chemical Engineering Co-op program is in line with departmental, Faculty, and University Work Integrated Learning (WIL) goals. It is proposed to be highly competitive, selective, and with capacity constraints to minimize effects on the undergraduate co-op program. Program capacity, limited to <10 students initially, would be based both on the performance of past MEng Co-op cohorts and that of our undergraduate co-op program. It would be "fail safe", where students who fail to find co-op positions may transfer into the regular MEng program.

The 2017 external review of the Chemical Engineering graduate programs included the following recommendation: "The Department consider if there might be opportunities to build on their excellent reputation of co-op at the undergraduate level and see how it might be used to define a unique strength in any one or more of their three graduate degree programs." Which resulted from direct consultation with graduate students. The proposed MEng Co-op program will address this external reviewer recommendation and consistent feedback from past MEng students regarding the desire for WIL within the program.

The co-op program/option will be supported by Co-operative Education. Attached is the Feasibility Report that was completed by Co-operative Education.

Note: a separate proposal to add a new Graduate Specialization in Entrepreneurship to the MEng in Chemical Engineering program is also moving through the approval process. If/when approved, the Graduate Specialization in Entrepreneurship will also be applied to the MEng in Chemical Engineering – Co-op program.

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-chemical-engineering

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:

MASTER OF ENGINEERING (MENG) IN CHEMICAL ENGINEERING
 	
Graduate specializations
 	
• Biological Engineering
• Polymer Science and Engineering
• Process Systems Engineering
 	
Program information
 	
• **Admit term(s)**
  ○ Fall
 	
• **Delivery mode**
  ○ On-campus
 	
• **Length of program**
  ○ Full-time: 4 terms (16 months)
  ○ Part-time: 8 terms (32 months)
 	
• **Program type**
  ○ Master's
  ○ Professional
 	
• **Registration option(s)**
  ○ Full-time
  ○ Part-time
 	
• **Study option(s)**
  ○ Coursework
 	
• **Additional program information**
  ○ 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.
 	
Admission requirements
 	
• **Minimum requirements**
  ○ A 75% overall standing in the last two years, or equivalent, in a four-year Honours Bachelor's degree or equivalent.
 	
• **Application materials**
	MASTER OF ENGINEERING (MENG) IN CHEMICAL ENGINEERING - CO-OPERATIVE PROGRAM
	
	Graduate specializations
	
	• Biological Engineering
	• Polymer Science and Engineering
	• Process Systems Engineering
	
	Program information
	
	• Admit term(s)
	  ○ Fall
	
	• **Delivery mode**
	  ○ On-campus
	
	• **Length of program**
	  ○ Full-time: 5-6 terms (20-24 months)
	
	• **Program type**
	  ○ Co-operative
	  ○ Master's
	  ○ Professional
	
	• **Registration option(s)**
	  ○ Full-time
	  ○ Part-time
	
	• **Study option(s)**
	  ○ Coursework
	
	• **Additional program information**
	  ○ 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.
	
	Admission requirements
	
	• **Minimum requirements**
	  ○ A 75% overall standing in the last two years, or equivalent, in a four-year Honours Bachelor's degree or

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:
○ Résumé ○ Supplementary information form ○ Transcript(s) • **References** ○ Number of references: 2 ○ Type of references: at least 1 academic • **English language proficiency (ELP)** (if applicable) **Degree requirements** • **Graduate Academic Integrity Module (Graduate AIM)** • **Courses** ○ 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: ▪ 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: ▪ Minimum cumulative average of 70%. ▪ Minimum grade of 65% in each individual course.	equivalent. • **Application materials** ○ Résumé ○ Supplementary information form ○ Transcript(s) • **References** ○ Number of references: 2 ○ Type of references: at least 1 academic • **English language proficiency (ELP)** (if applicable) **Degree requirements** <u>The MEng in Chemical Engineering - Co-operative Program will enable students to combine graduate studies with work experience.</u> <u>The program includes completion of 1-2 required work terms. The work term(s) typically takes place in term 4 (or terms 4 and 5). The work term(s) must meet CEE standard work term requirements and Departmental requirements. Student's should apply to jobs related to their program of study.. Note: the program must start and end on an academic term. Students in the program are encouraged to complete COOP 601 Career Success Strategies in the academic term prior to the first work term.</u> • **Graduate Academic Integrity Module (Graduate AIM)** • **Courses** ○ Students must complete CHE 600 Engineering and Research Methods, Ethics, Practice, and Law (0.25 credit weight), <u>CHE 650 Engineering Work-term Experience Report (0.25 credit weight, must be completed in term 5 or 6)</u> and 8 graduate courses (0.50 unit weight per course) as follows: ▪ CHE 601 Theory and Application of Transport Phenomena ▪ CHE 602 Chemical Reactor Analysis ▪ 6 graduate level electives of which 3 must be CHE courses

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:
▪ 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: 1. Biological Engineering 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 Specialization on their transcript if they have completed the requirements associated with the MEng degree and the requirements associated with the Graduate Specialization. ○ 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. 1. Graduate Specialization in Biological Engineering	○ 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: ▪ 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: 1. Biological Engineering 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 Specialization on their transcript if they have completed the requirements associated with the MEng degree and

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:
○ To receive the Graduate Specialization in Biological Engineering, students must successfully complete 3 compulsory courses and 1 elective course: ▪ Compulsory courses: ▪ CHE 562 Advanced Bioprocess Engineering ▪ CHE 660 Principles of Biochemical Engineering ▪ CHE 663 Bioseparations ▪ Elective courses (choose 1 from the following list): ▪ CHE 561 Biomaterials & Biomedical Design ▪ CHE 564 Food ProcessEngineering 2. Graduate Specialization in Polymer Science and Engineering ○ To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 541 Introduction to Polymer Science and Properties ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 543 Polymer Production: Polymer Reaction Engineering ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations 3. Graduate Specialization in Process Systems Engineering ○ To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2	the requirements associated with the Graduate Specialization. ○ 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. 1. Graduate Specialization in Biological Engineering ○ To receive the Graduate Specialization in Biological Engineering, students must successfully complete 3 compulsory courses and 1 elective course: ▪ Compulsory courses: ▪ CHE 562 Advanced Bioprocess Engineering ▪ CHE 660 Principles of Biochemical Engineering ▪ CHE 663 Bioseparations ▪ Elective courses (choose 1 from the following list): ▪ CHE 561 Biomaterials & Biomedical Design ▪ CHE 564 Food ProcessEngineering 2. Graduate Specialization in Polymer Science and Engineering ○ To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 541 Introduction to Polymer Science and Properties

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:
compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 520 Process Flowsheet Analysis ▪ CHE 521 Process Optimization ▪ CHE 522 Advanced Process Dynamics and Control • **Seminar Attendance** ○ 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.	▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 543 Polymer Production: Polymer Reaction Engineering ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations 3. Graduate Specialization in Process Systems Engineering ○ To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 520 Process Flowsheet Analysis ▪ CHE 521 Process Optimization ▪ CHE 522 Advanced Process Dynamics and Control • **Seminar Attendance** ○ 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.

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:

	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.
	
	• **Graduate Studies Work Report**
	  ○ Students must complete one or two work-term experience(s). A work report must be submitted to the Department for review and credit by the end of each work term.
	  ○ Students are responsible for following the roles and responsibilities of Co-operative and Experiential Education (CEE).

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

Students currently registered in the program will not have access to this program in that it is admit-only and will be unaffected.

Department/School approval date (mm/dd/yy): 09/12/2022
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/15/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

CO-OPERATIVE AND EXPERIENTIAL EDUCATION
Co-operative Education
519-888-4026 | ceehub@uwaterloo.ca

Co-operative & Experiential Education (CEE)

Preliminary review

Proposed Program: Master of Engineering, Chemical Engineering, Co-operative Education

Program Effective Date: Fall 2023

Requested by: Nassar Mohieddin Abukhdeir, Associate Chair, Chemical Engineering

Prepared by: Richard Wikkerink, Director, Student & Faculty Relations, Co-operative Education

Executive Summary

The Department of Chemical Engineering has expressed intent to add a program-level work integrated learning (WIL) experience (co-op) option to their master's program for fall 2023. The co-op components of the degree will be fully administered by Co-operative & Experiential Education (CEE) with the work integrated learning (WIL) component included as a milestone degree requirement.

CEE will utilize existing staff, resources, and co-op processes across the portfolio, to support this new program, as it does for other graduate co-op programs in Engineering. CEE will require sufficient time to complete a new program plan and will work with the program in the coming months to address system and records processing needs, WIL programming and job development opportunities.

An industry and jobs analysis is not included in this report as there was insufficient advanced notice. Analysis, completed by CEE, will follow in 2023 and encompass all existing, new, and anticipated graduate co-op plans in the Faculty of Engineering.

With the understanding of a cap of 5 students for fall 2023, CEE supports in principle the proposed new MEng Chemical Engineering Co-op program and will collaborate with the academic unit on the development and administration of co-op components of the degree.

CEE recommends the Department of Chemical Engineering (Graduate Studies) consider the following:

- Establish new co-op admission requirements for Fall 2023 so that students may be directly admitted to the program, reducing barriers for international students who are required to obtain a co-op work permit to work in Canada

- Include co-op degree requirements in graduate calendar
- Review the implications of involvement in co-op as related to items such as, but not limited to, student statuses, funding packages and scholarships.

CEE, with leadership from the designated Faculty Relations Manager, will:

- Complete a labor market and co-op job analysis for MEng programs, sharing this data with the grad job development working group to inform Account Management (AM) and Business Development (BD) activities and targets. The Senior Advisor working with Engineering and Mitacs is included in this group
- Collaborate with the Associate Chair Graduate Studies for Chemical Engineering and the Graduate Officer/Coordinator to work through the Co-op Program Plan

Work-Integrated Learning at UW

Co-operative Education is a form of work integrated learning (WIL), which allows students to apply classroom learning to the workplace and, likewise, connect workplace learning to their degree and areas of specialization. For those students who are seeking a stronger connection between their studies and industry, the University of Waterloo's co-op programs distinguish it amongst Canadian institutions. Furthermore, CEE provides a robust system of support for students (domestic and international visa) seeking work experiences in Canada or internationally.

Benefits go beyond the students. Industry partners benefit by gaining access to a wider range of grad students who bring varied experiences personally, professionally, and academically. All stakeholders will benefit from opportunities for idea exchange and strengthened connection between academic research and innovations in industry.

Introducing a new co-op plan aligns with the strategic focus on GradWIL at an institutional level and will continue to reinforce UW as a WIL leader for both undergraduate and graduate programs.

The key components of a quality WIL experience are pedagogy, experience, assessment and reflection, or P.E.A.R. Making sure all four elements are included in the development of program-level WIL are critical for creating a qualify WIL experience.

- Pedagogy – includes the academic course content and the WIL curriculum
- Experience – meaningful and aligned appropriately with the WIL model
- Assessment – including the learning outcomes for the program + Future Ready Talent Framework
- Reflection – on the WIL experience and in alignment with the idea of "purposeful work"

Co-op Program Structure

The MEng Chemical Engineering Co-op program, as with other graduate co-op programs, will follow the existing co-op model. All co-op students are responsible for following the procedures, roles and responsibilities of co-op students.

Co-op students are strongly encouraged to complete PD 601 prior to their first co-op work term (typically completed in their Winter term/second study term) prior to the co-op experience and while they apply to jobs concurrently. PD 601 provides information on navigating the co-op employment process, foundational career preparation and teaches students how to prepare professional job search documents. Some graduate programs have positioned PD 601 as a foundational requirement for co-op participation. Students who have already completed similar UW co-op preparation modules (e.g.: PD1 Career

Fundamentals) will not be required to take PD 601. Note: PD 601 is currently going through a major re-development of course content, with an expected launch of Winter 2024.

The Centre for Career Action (CCA) provides career and co-op preparation resources and services (e.g.: resume, cover letter, interview preparation, job search, etc.) for all graduate students. These services are accessed more readily when promoted by the academic program or incorporated into existing courses. Additional collaboration between Chemical Engineering, SFR and CCA may be required prior to Fall 2023 to establish how existing services and staff will be utilized.

Co-op work terms must meet standard work term requirements for all graduate students. Chemical Engineering students will have access to the co-op job board through WaterlooWorks or may arrange their own employment, externally, which must be approved by CEE. During the experience, graduate students will be supported by Co-op Advisors through site visits, e-check-ins, work term ratings. Employers will evaluate the work performance of students via the Student Performance Evaluation (SPE); a rating of 'satisfactory' or above will grant the student credit for the work term.

As a best practice, it is recommended students in Graduate Co-op plan return for a final study term following the co-op work experience. The program will facilitate a work report or reflection assignment post-experience, which will also be a co-op degree milestone.

To evaluate program effectiveness and WIL outcomes, the CEE Faculty Relations Manager, Engineering, will monitor key metrics annually to ensure program quality.

Co-op Sequence

Students in MEng Chemical Engineering will be required to complete one standard co-op work term; however, CEE strongly recommends that the program allow for two consecutive co-op work terms in their program structure. Strategically, this proposed sequence would provide a longer immersive work experience for students, which is particularly appealing to industry partners, and would be consistent with other UW graduate co-op plans.

The proposed program will have students scheduled for Fall and Winter work terms, differing slightly from other graduate co-op sequences. This plan has students available to work in Winter terms, which historically have had low numbers of graduate co-op students scheduled to work.

MEng Chemical Engineering Co-op Sequence:

Fall	Winter	Spring	Fall	Winter	Spring
Study Direct-entry co-op	Study	Study Co-op prep course	**Work Term**	**Work Term**	Final course Completion of Work Report

Co-op Admissions

Programs seeking to add co-op as an option for their students, must do so by creating a direct-entry co-op program. There are a range of benefits to this structure, including CEE's ability to forecast earlier the number of students expected to be scheduled for a work term from the program and adjust employer and student-facing resources as necessary. Most notably, CEE can assist visa students in their work permit applications upon program admission, ensuring work terms are not negatively impacted by processing times.

Beginning Fall 2023, students will apply and be directly admitted into the MEng Chemical Engineering Co-op plan. The academic unit will need to establish a specific process and criteria for admissions into this new program.

Where there is demand for co-op, consideration should be given to the value and intention of a WIL experience, as academic standing is not always an indicator of workplace success. Additionally, graduate students bring a range of personal, professional, and academic experiences and so while the more experienced students may ultimately be successful in finding co-op employment, they arguably may not be the students to benefit most from the WIL experience.

Degree Requirements

Graduate students completing the co-operative education degree requirements will receive a "Co-operative Education" degree designation. These requirements include the following:

- Complete a minimum of 1 standard co-op work term and receive a Student Performance Evaluation of "marginal" or better
- Complete a work report/reflection requirement administered by the academic department

Note: as part of the GradWIL project, and in alignment with quality WIL standards, work is underway to enhance the graduate student co-op experience over the next two years. This includes the re-development of the co-op preparation course (PD 601) and the creation of a major reflective report post-experience. Graduate co-op programs

should anticipate future calendar changes including additional co-op degree requirements for their students.

Graduate Student Support

The Centre for Career Action (CCA) is in the Tatham Centre at the Waterloo campus and provides support to undergrad and grad students (whether in co-op or not), alumni and staff with co-op and career planning and preparation. Existing services include 1:1 appointments for resumes, cover letters, interview skills, work search, career planning and others, 1:1 drop-ins, workshops, both on and offline resources and supports all offered through a dedicated team of existing co-op and career staff.

Chemical Engineering graduate co-op students will be assigned to a team of Career Advisors who provide answers to co-op related questions as well as support throughout the co-op recruitment process. Once students secure a work term, they are offered additional support via a dedicated co-op Student Advisor who is available throughout the term, and provides a work term consultation and reviews e-check-ins.

Job Development

A New Program Plan will be completed between the Faculty Relations Manager, Engineering and will review the labour market, job demands, and areas for business development. With the newly established graduate job development working group in CEE, there is additional focus on strategies to develop jobs that are meaningful for the learning of graduate co-op students.

Generally, there are two years of lead time needed to develop jobs ahead of the first work term. With strong connections into associated industries, CEE can provide a range of suitable opportunities for students. As a course-based program with many pathways, marketing these students to employers may be challenging given the more specialized and focused areas of expertise and knowledge graduate students bring. Best efforts will be made to support graduate students in their job search – for example, CEE has proactively been engaged with Mitacs and the funding they have access to for WIL at the graduate level. Existing services and expertise in CCA will be leveraged to support students in their job search, noting that the new program plan will examine the resources required to provide these supports.

Note: Given the evolving landscape of graduate co-op in the Faculty of Engineering, and in anticipation of more programs coming forward to include a co-op option, CEE will complete an industry and job analysis in 2023. This report will consider all existing and new Master of Engineering co-op programs and will inform job development strategies for the growing numbers of students in these plans.

Additional Considerations
Graduate WIL

CEE and the GSPA, along with the faculties are undergoing a multi-unit, multi-year project to expand WIL offerings at the graduate level and enhance CEE co-op programming, support, and processes for graduate students. Therefore, graduate co-op will undergo several changes over the coming years which will impact existing programming, support, and job development efforts for graduate students.

Student Status and Fees

Graduate co-op students have their term status changed to co-op and pay a co-op fee during employed co-op work terms. Participation in graduate co-op may have implications for student statuses, funding packages and scholarships. The program will need to investigate further and make students aware of this.

International Students and Work Experiences

The CEE international team will support work terms held outside of Canada, adhering to UW and Global Affairs Canada (GAC) travel polices and advisories.

Students studying on a visa must obtain a co-op work permit in order to find employment for a co-op work term. Applying for a co-op work permit in Canada can take several months, with recent processing times taking at least six months. Direct admissions to the co-op program, allowing CEE to identify co-op students as early as possible, allows students to apply earlier and avoid delaying co-op employment.

Equity

Equity is an important component to consider within a competitive admissions and co-op process. For example, international students may encounter additional barriers such as: varying levels and types of work experience of incoming students, potential for travel restrictions, as well as the complexities of obtaining funding and/or security clearance that may be required for some roles can often be a disadvantage to international students and can delay or impact work term opportunities.

Co-op Program Plan

Following all levels of academic program approval for this new program and before the first term of admission, a Co-op Program Plan will be required. The Co-op Program Plan is a checklist of information, records, system, communications, etc., that ensure CEE administered co-op plans are set-up appropriately and necessary decisions are made. This is a collaborative activity led by a designated Faculty Relations Manager and the academic unit.

UNIVERSITY OF WATERLOO

Graduate Studies Program Revision Template

This item is for consideration on SGRC Regular Agenda

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: Engineering

Program: Master of Engineering (MEng) in Chemical Engineering

Program contact name(s): Nasser Mohieddin Abukhdeir, Judy Caron

Form completed by: Nasser Mohieddin Abukhdeir

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

Updating the MEng degree requirements to include one new Graduate Specialization in Entrepreneurship.

Is this a major modification to the program? Yes

Rationale for change(s):

The proposed MEng Graduate Specialization in Entrepreneurship is aligned with the long-term vision of the Department of Chemical Engineering, the Conrad School of Entrepreneurship and Business, and the University. The majority of past MEng students have chosen to take at 2-3 Business Entrepreneurship (BE) courses and have provided positive feedback to the Department regarding their utility and the additional breadth in the training. Providing a formal curriculum which focuses on entrepreneurship leverages MEng student interest and focuses it on a strategic area which needs to be enhanced in the discipline, entrepreneurship.

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-chemical-engineering/master-engineering-meng-chemical-engineering

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

Degree requirements
• **Courses**
  ○ 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:
	Degree requirements
	• **Courses**
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Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
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Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
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 associated with the MEng degree and the requirements associated with the Graduate Specialization. ○ 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. 1. Graduate Specialization in Biological Engineering ○ To receive the Graduate Specialization in Biological Engineering, students must successfully complete 3 compulsory courses and 1 elective course: ▪ Compulsory courses: ▪ CHE 562 Advanced Bioprocess Engineering ▪ CHE 660 Principles of Biochemical Engineering ▪ CHE 663 Bioseparations ▪ Elective courses (choose 1 from the following list): ▪ CHE 561 Biomaterials & Biomedical Design ▪ CHE 564 Food ProcessEngineering 2. Graduate Specialization in Polymer Science and Engineering ○ To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses:	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 associated with the MEng degree and the requirements associated with the Graduate Specialization. ○ 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. <u>Note: Students are limited to one Graduate Specialization designation for their MEng in Chemical Engineering degree.</u> 1. Graduate Specialization in Biological Engineering ○ To receive the Graduate Specialization in Biological Engineering, students must successfully complete 3 compulsory courses and 1 elective course: ▪ Compulsory courses: ▪ CHE 562 Advanced Bioprocess Engineering ▪ CHE 660 Principles of Biochemical Engineering ▪ CHE 663 Bioseparations ▪ Elective courses (choose 1 from the following list): ▪ CHE 561 Biomaterials & Biomedical Design ▪ CHE 564 Food ProcessEngineering 2. Graduate Specialization in Polymer Science and Engineering

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content:**
▪ CHE 541 Introduction to Polymer Science and Properties ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 543 Polymer Production: Polymer Reaction Engineering ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations 3. Graduate Specialization in Process Systems Engineering o To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 520 Process Flowsheet Analysis ▪ CHE 521 Process Optimization ▪ CHE 522 Advanced Process Dynamics and Control	o To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 541 Introduction to Polymer Science and Properties ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 543 Polymer Production: Polymer Reaction Engineering ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations 3. Graduate Specialization in Process Systems Engineering o To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 520 Process Flowsheet Analysis ▪ CHE 521 Process Optimization ▪ CHE 522 Advanced Process Dynamics and Control <u>4. Graduate Specialization in Entrepreneurship</u>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	○ Students must obtain approval from the Chemical Engineering Graduate Officer in order to pursue the Graduate Specialization in Entrepreneurship. Interested students will be required to submit a short proposal following matriculation describing their entrepreneurship idea and suitability to pursue it. ○ To receive the Graduate Specialization in Entrepreneurship, students must successfully complete the following 4 compulsory courses: ▪ Compulsory courses: ▪ BE 600 Management and Leadership ▪ BE 605 Project Management ▪ BE 606 Entrepreneurship and Innovation ▪ CHE 651 Technology Entrepreneurship Project

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

Current MEng students will not have access to this specialization and will be unaffected.

Department/School approval date (mm/dd/yy): 09/12/2022
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/15/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

UNIVERSITY OF WATERLOO

Graduate 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: Engineering

Program: 1) Doctor of Philosophy (PhD) in Chemical Engineering

2) Doctor of Philosophy (PhD) in Chemical Engineering - Nanotechnology

3) Doctor of Philosophy (PhD) in Chemical Engineering - Water

Program contact name(s): Nasser Mohieddin Abukhdeir, Judy Caron

Form completed by: Nasser Mohieddin Abukhdeir

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

1) *Adding a PhD Advisory Committee Meeting and Report milestone to the degree requirements.*
2) *Updating the PhD Comprehensive Examination description and requirements.*

Is this a major modification to the program? No

Rationale for change(s):

1) *The PhD Advisory Committee Meeting and Report will provide increased support to students and their supervisors. Performance feedback will be provided to students prior to the PhD comprehensive examination for direct admit students and between the PhD comprehensive examination and defence for direct and standard admit students. Formal feedback will be provided from faculty other than the supervisor(s).*
2) *To be consistent with the University and Faculty of Engineering-level PhD Comprehensive Examination minimum requirements.*

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-chemical-engineering/doctor-philosophy-phd-chemical-engineering

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-chemical-engineering/doctor-philosophy-phd-chemical-engineering-nanotechnology

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-chemical-engineering/doctor-philosophy-phd-chemical-engineering-water

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
Degree requirements • **PhD Comprehensive Examination** ~~o The PhD Comprehensive Examination (due in 4th term) consists of an oral examination conducted at the University of Waterloo with the candidate and members of the Comprehensive Examining Committee present. The examination consists of the following two parts:~~ ~~▪ An examination of the research proposal that the student intends to develop into a successful PhD research thesis.~~ ~~▪ An examination of the breadth of the candidate's knowledge of the academic field of the thesis and the adequacy of the candidate's background preparation to pursue the proposed research.~~	**Degree requirements** • **<u>PhD Advisory Committee Meeting and Report</u>** o <u>Students are required to engage in a 30-60 minute, in-person or remote, PhD Advisory Committee meeting, composed of a 15-minute presentation by the student to report research progress along with a written summary of courses and milestones completed.</u> o <u>The PhD Advisory Committee provides the student with a PhD Advisory Committee Report describing progress on coursework and milestones completed and an assessment by each committee member of the student's progress (excellent, satisfactory, unsatisfactory) in the following areas:</u> ▪ <u>Understanding of material</u> ▪ <u>Ability to handle discussion</u> ▪ <u>Preparation, presentation, and organization</u> ▪ <u>Research progress</u> ▪ <u>Coursework progress</u> ▪ <u>Overall</u> o <u>Students with a MASc degree must complete a PhD Advisory Committee meeting during the 3rd term after completing their PhD comprehensive examination, with no extensions.</u> o <u>Students without a MASc degree must complete a PhD Advisory Committee Meeting during (i) the 4th term from the start of their program and (ii) the 3rd term after completing their PhD comprehensive examination, with no extensions.</u> o <u>All PhD students will be required to complete a 2nd PhD Advisory Committee Meeting the 3rd term after completion of a previous PhD Advisory Committee Meeting in which their overall progress was assessed as "unsatisfactory" unless they have scheduled a PhD comprehensive examination or defense during that term.</u> • **PhD Comprehensive Examination** o <u>Students are required to meet the University-level PhD Comprehensive</u>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	Examination minimum requirements outlined in the "Minimum requirements for the PhD degree" section of the Graduate Studies Academic Calendar (GSAC), with certain noted differences that are specific to the Faculty of Engineering Comprehensive Examination minimum requirements: ▪ Comprehensive examination purpose: Consistent with University-level minimum requirements. ▪ Timing: Students must follow the Faculty of Engineering completion timelines whereby students shall complete their comprehensive examination before the end of their 4th term or 6th term in cases where the student is admitted to the PhD program without a completed Master's degree. ▪ Committee: Students must follow the Faculty of Engineering committee composition guidelines which differ from the University-level minimum requirements in both number of committee members and committee makeup. ▪ Who Chairs an examination: Consistent with University-level minimum requirements. ▪ Format / Content: Consistent with University-level minimum requirements but with additional information provided in the Faculty of Engineering Comprehensive Examination minimum requirements. ▪ Academic integrity: Consistent with University-level minimum requirements

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

Students currently registered would not be affected by this change and would instead conform to the degree requirements in place when they started the PhD program.

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

Department/School approval Date (mm/dd/yy) 09/12/2022
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/15/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Engineering

Effective date: Term: Spring Year: 2023

Milestone

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

☒ New: Choose an item. PhD Advisory Committee Meeting and Report

☐ Inactivate: Choose an item.

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

Course

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

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: Choose an item.

Course number:

Course ID:

Course title (max. 100 characters including spaces):

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

Grading basis: Choose an item.

Course credit weight: Choose an item.

Course consent required: Choose an item.

Course description:

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

Primary meet type: Choose an item.

Delivery mode: Choose an item.

Requisites:

Special topics course: Yes ☐ No ☐

Cross-listed course: Yes ☐ No ☐

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

Sections combined/held with:

Rationale for request:

*The addition of a requirement for **direct entry** PhD students to meet with their advisory committee at least once before their comprehensive exam and again between their comprehensive and PhD defence. This is an important part of monitoring a student academic progression and providing students with timely feedback on their thesis writing and research progress.*

Please add the PhD Advisory Commitee Meeting and Report milestone to the direct entry programs listed below:

1) *Doctor of Philosophy (PhD) in Chemical Engineering*
2) *Doctor of Philosophy (PhD) in Chemical Engineering- Water*
3) *Doctor of Philosophy (PhD) in Chemical Engineering- Nanotechnology*

Form completed by: Judy Caron
Department/School approval date (mm/dd/yy): 09/12/22
Reviewed by GSPA (for GSPA use only) ☐ date (mm/dd/yy):
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Engineering

Effective date: Term: Fall Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Creating SYDE 663 to cross-list with ENGL 701.

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

Course subject code: SYDE

Course number: 663

Course ID: 016198

Course title (max. 100 characters including spaces): Critical Design Methods

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Choose an item.

Course description:

This course introduces students to both the theory and practice of Critical Design, broadly construed. Critical Design is not a field of its own, but a mode of design thinking that is informed by critical theories and research methods. Critical Design can intersect with and draw on established fields of design from graphic and UX design to industrial and urban design. The course begins with an overview of the history of design as critique, before examining the recent emergence of research-creation practices such as speculative design, critical making, discursive design, and applied media theory. The positionality of designers and audiences will be considered in readings and assignments that focus on gender, disability, race, and class. Special attention will be paid to the design of media technologies and the infrastructures that support them, which involves methods in UX design, sustainable hardware design, and digital urban design. Students will demonstrate their knowledge of course materials through writing, design, and light fabrication.

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

Primary meet type: Lab

Delivery mode: On-campus

Requisites:

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☒ No ☐

Course subject code(s) and number(s) to be cross-listed with and approval status: ENGL 701 (cross-list request for ENGL 701 also submitted)

Sections combined/held with:

Rationale for request:

The project-based design of this course encourages students to intervene directly in the tech ecology by promoting responsible design practices across disciplines. To this end, the course has historically supported collaboration between students in ENGL and SYDE. The proposed cross-listing will help solidify the course's interdisciplinary focus and facilitate knowledge transfer between students who have similar interests in responsible design but who come from very different disciplinary backgrounds. The course can potentially serve as a model for how Arts and STEM disciplines can work together to promote responsible innovation

Form completed by: S. Landy on behalf of J. Savarese
Department/School approval date (mm/dd/yy): 04/14/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/01/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Arts

Effective date: Term: Fall Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☒ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Cross-listing SYDE 663 with ENGL 701.

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

Course subject code: ENGL

Course number: 701

Course ID: 016198

Course title (max. 100 characters including spaces): Critical Design Methods

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Choose an item.

Course description:

This course introduces students to both the theory and practice of Critical Design, broadly construed. Critical Design is not a field of its own, but a mode of design thinking that is informed by critical theories and research methods. Critical Design can intersect with and draw on established fields of design from graphic and UX design to industrial and urban design. The course begins with an overview of the history of design as critique, before examining the recent emergence of research-creation practices such as speculative design, critical making, discursive design, and applied media theory. The positionality of designers and audiences will be considered in readings and assignments that focus on gender, disability, race, and class. Special attention will be paid to the design of media technologies and the infrastructures that support them, which involves methods in UX design, sustainable hardware design, and digital urban design. Students will demonstrate their knowledge of course materials through writing, design, and light fabrication.

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

Primary meet type: Lab

Delivery mode: On-campus

Requisites:

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☒ No ☐

Course subject code(s) and number(s) to be cross-listed with and approval status: SYDE 663 (cross-list request for SYDE 663 also submitted)

Sections combined/held with:

Rationale for request:

The project-based design of this course encourages students to intervene directly in the tech ecology by promoting responsible design practices across disciplines. To this end, the course has historically supported collaboration between students in ENGL and SYDE. The proposed cross-listing will help solidify the course's interdisciplinary focus and facilitate knowledge transfer between students who have similar interests in responsible design but who come from very different disciplinary backgrounds. The course can potentially serve as a model for how Arts and STEM disciplines can work together to promote responsible innovation.

Form completed by: S. Landy on behalf of J. Savarese
Department/School approval date (mm/dd/yy): 12/17/21
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/01/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

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: Engineering

Program: Master of Applied Science (MASc) in Systems Design Engineering

Program contact name(s): Eihab Abdel-Rahman

Form completed by: Sarah Landy

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

1) *Expand the elective course list to include courses from the Faculties of Engineering, Mathematics, Health, Environment, and Science.*
2) *Update the Seminar requirements for all MASc programs.*
3) *Update the Seminar Attendance requirements for all MASc programs.*
4) *Revise the length of program information.*

Is this a major modification to the program? No

Rationale for change(s):

1) *Systems Design Engineering is a department which prides itself on the interdisciplinary and diverse nature of its researchers. As such, it is appropriate to allow our graduate students to pick from a larger suite of courses to meet their elective degree requirements so that their course selection can be better tailored to their individual research plans.*
2) *The updating of the seminar requirement is required to more clearly articulate the requirements for the student and update the practices of the Department which allow for seminars to occur outside of the Systems Design Engineering Graduate Colloquium.*
3) *The updating of the seminar attendance requirement is required to remove the reference to Seminar Attendance Certificates which are not currently in use by the Department.*
4) *The length of program information is being revised since the current duration listed in the GSAC is inaccurate as it references the length of the MEng in Systems Design Engineering program.*

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-systems-design-engineering/master-applied-science-masc-systems-design-engineering

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

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

Program information
 	
• **Admit term(s)**
  ○ Fall
  ○ Winter
  ○ Spring
 	
• **Delivery mode**
  ○ On-campus
 	
• **Length of program**
  ○ ~~The normal duration of this program is 16 months.~~
 	
• **Program type**
  ○ Master's
  ○ Research
 	
• **Registration option(s)**
  ○ Full-time
  ○ Part-time
 	
• **Study option(s)**
  ○ Thesis
 	
Degree requirements
 	
• **Courses**
  ○ Students must complete 4 ~~Engineering~~ graduate courses (0.50 unit weight per course) counting towards degree credit from the University of Waterloo satisfying the following criteria:
  ▪ At least 2 courses from Systems Design Engineering at the 500, 600 or 700 level.
  ▪ At most 1 course at the 500 level.
  ▪ At least 1 course at the 600 level.
  ○ All course selections are arranged by the supervisor(s) in consultation with the student and are subject to the approval of the Associate Chair for Graduate Studies. Students pursuing one the program's Graduate Research Fields, should inform their supervisor(s) of their chosen field(s) to ensure appropriate course selection.
  ○ Note: these requirements are in addition to satisfactory completion of
	Program information
	
	• **Admit term(s)**
	  ○ Fall
	  ○ Winter
	  ○ Spring
	
	• **Delivery mode**
	  ○ On-campus
	
	• **Length of program**
	  ○ Students are required to complete the program in accordance with the University program time limits.
	
	• **Program type**
	  ○ Master's
	  ○ Research
	
	• **Registration option(s)**
	  ○ Full-time
	  ○ Part-time
	
	• **Study option(s)**
	  ○ Thesis
	
	Degree requirements
	
	• **Courses**
	  ○ Students must successfully complete 4 graduate courses (0.50 unit weight per course) counting towards degree credit from the University of Waterloo satisfying the following criteria:
	  ▪ At least 2 courses from Systems Design Engineering at the 500, 600 or 700 level.
	  ▪ A maximum of 2 courses may be taken from outside the Faculty of Engineering but must be from the Faculties of Mathematics, Health, Environment and/or Science.
	  ▪ At most 1 course at the 500 level.
	  ▪ At least 1 course at the 600 level.
	  ○ All course selections are arranged by the supervisor(s) in consultation with the student and are subject to the approval of the Associate Chair for Graduate Studies. Students pursuing

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
any transitional courses that may be specified at the time of admission. ○ Note: the Faculty of Engineering requires that no more than one-half of the courses used for credit toward a graduate degree may be taught by a candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule; however, the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **Master's Seminar** ○ Students are required to present a research seminar on their thesis at the Systems Design Engineering Graduate Colloquium~~. The Department will contact seminar candidates with scheduling information after they have passed their comprehensive exam~~. • **Seminar Attendance** ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term. It is the student's responsibility to ~~submit their "Seminar Attendance Certificates" attached~~ to their activity report. ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms the student has been registered as a full-time student in the Department.	one the program's Graduate Research Fields, should inform their supervisor(s) of their chosen field(s) to ensure appropriate course selection. ○ Note: these requirements are in addition to satisfactory completion of any transitional courses that may be specified at the time of admission. ○ Note: the Faculty of Engineering requires that no more than one-half of the courses used for credit toward a graduate degree may be taught by a candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule; however, the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **Master's Seminar** ○ Students are required to present a research seminar on their thesis at the Systems Design Engineering Graduate Colloquium <u>or at a publicly attended seminar administered by their supervisor and advertised by the Department. The thesis readers should be invited to attend the seminar.</u> • **Seminar Attendance** ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term <u>and 2 per part-time term</u>. It is the student's responsibility to <u>attach a list of seminars attended</u> to their activity report. ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms the student has been registered as a full-time student in the Department.

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

1) Current students would be permitted to take advantage of this change and select courses from within the approved Faculties for their electives.

2-3) Current students may abide by the new seminar and seminar attendance requirements.

4) Current students will not be impacted by the change.

Department/School approval date (mm/dd/yy): 11/10/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/17/22
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: Engineering

Program: Master of Applied Science (MASc) in Systems Design Engineering - Aeronautics

Program contact name(s): Eihab Abdel-Rahman

Form completed by: Sarah Landy

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

1) *Expand the elective course list to include courses from the Faculties of Engineering, Mathematics, Health, Environment, and Science.*
2) *Update the Seminar requirements for all MASc programs.*
3) *Update the Seminar Attendance requirements for all MASc programs.*
4) *Revise the length of program information.*

Is this a major modification to the program? No

Rationale for change(s):

1) *Systems Design Engineering is a department which prides itself on the interdisciplinary and diverse nature of its researchers. As such, it is appropriate to allow our graduate students to pick from a larger suite of courses to meet their elective degree requirements so that their course selection can be better tailored to their individual research plans.*
2) *The updating of the seminar requirement is required to more clearly articulate the requirements for the student and update the practices of the Department which allow for seminars to occur outside of the Systems Design Engineering Graduate Colloquium.*
3) *The updating of the seminar attendance requirement is required to remove the reference to Seminar Attendance Certificates which are not currently in use by the Department.*
4) *The length of program information is being revised since the current duration listed in the GSAC is inaccurate as it references the length of the MEng in Systems Design Engineering program.*

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-systems-design-engineering/master-applied-science-masc-systems-design-engineering-aeronautics

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

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

Program information
 	
• **Admit term(s)**
  ○ Fall
  ○ Winter
  ○ Spring
 	
• **Delivery mode**
  ○ On-campus
 	
• **Length of program**
  ○ ~~The normal duration of this program is 16 months.~~
 	
• **Program type**
  ○ Collaborative
  ○ Master's
  ○ Research
 	
• **Registration option(s)**
  ○ Full-time
  ○ Part-time
 	
• **Study option(s)**
  ○ Thesis
 	
Degree requirements
 	
• **Courses**
  ○ Students must complete AVIA 601 Interdisciplinary Aeronautics, AVIA 602 Interdisciplinary Aeronautics Project, and 3 ~~Engineering~~ graduate courses (0.50 unit weight per course) counting towards degree credit from the University of Waterloo satisfying the following criteria:
  ▪ At least 2 courses from Systems Design Engineering at the 500, 600 or 700 level.
  ▪ At most 1 course at the 500 level.
  ▪ At least 1 course at the 600 level.
  ○ This degree is offered through the Collaborative Aeronautics Program. This program, jointly offered by a range of departments/schools across several academic faculties, promotes the development of interdisciplinary perspectives on aeronautics. Collaborative Aeronautics Program
	Program information
	
	• **Admit term(s)**
	  ○ Fall
	  ○ Winter
	  ○ Spring
	
	• **Delivery mode**
	  ○ On-campus
	
	• **Length of program**
	  ○ Students are required to complete the program in accordance with the University program time limits.
	
	• **Program type**
	  ○ Collaborative
	  ○ Master's
	  ○ Research
	
	• **Registration option(s)**
	  ○ Full-time
	  ○ Part-time
	
	• **Study option(s)**
	  ○ Thesis
	
	Degree requirements
	
	• **Courses**
	  ○ Students must successfully complete AVIA 601 Interdisciplinary Aeronautics, AVIA 602 Interdisciplinary Aeronautics Project, and 3 graduate courses (0.50 unit weight per course) counting towards degree credit from the University of Waterloo satisfying the following criteria:
	  ▪ At least 2 courses from Systems Design Engineering at the 500, 600 or 700 level.
	  ▪ A maximum of 1 course may be taken from outside the Faculty of Engineering but must be from the Faculties of Mathematics, Health, Environment or Science.
	  ▪ At most 1 course at the 500 level.
	  ▪ At least 1 course at the 600 level.
	  ○ This degree is offered through the Collaborative Aeronautics Program.

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
students complete their specialist training in their respective home departments/schools, while working with colleagues from a variety of other departments/schools in core interdisciplinary courses (AVIA 601 and AVIA 602). ○ All course selections are arranged by the supervisor(s) in consultation with the student and are subject to the approval of the Associate Chair for Graduate Studies. ○ Note: these requirements are in addition to satisfactory completion of any transitional courses that may be specified at the time of admission. ○ Note: the Faculty of Engineering requires that no more than one-half of the courses used for credit toward a graduate degree may be taught by a candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule; however, the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **Master's Seminar** ○ Students are required to present a research seminar on their thesis at the Systems Design Engineering Graduate Colloquium~~. The Department will contact seminar candidates with scheduling information after they have passed their comprehensive exam~~. • **Seminar Attendance** ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term. It is the student's responsibility to ~~submit their "Seminar Attendance Certificates" attached~~ to their activity report. ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms	This program, jointly offered by a range of departments/schools across several academic faculties, promotes the development of interdisciplinary perspectives on aeronautics. Collaborative Aeronautics Program students complete their specialist training in their respective home departments/schools, while working with colleagues from a variety of other departments/schools in core interdisciplinary courses (AVIA 601 and AVIA 602). ○ All course selections are arranged by the supervisor(s) in consultation with the student and are subject to the approval of the Associate Chair for Graduate Studies. ○ Note: these requirements are in addition to satisfactory completion of any transitional courses that may be specified at the time of admission. ○ Note: the Faculty of Engineering requires that no more than one-half of the courses used for credit toward a graduate degree may be taught by a candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule; however, the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **Master's Seminar** ○ Students are required to present a research seminar on their thesis at the Systems Design Engineering Graduate Colloquium <u>or at a publicly attended seminar administered by their supervisor and advertised by the department. The thesis readers should be invited to attend the seminar.</u> • **Seminar Attendance** ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term <u>and 2 per part-time term</u>. It is the student's responsibility to <u>attach a list of</u>

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
the student has been registered as a full-time student in the Department.	seminars attended to their activity report. ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms the student has been registered as a full-time student in the Department.

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

1) Current students would be permitted to take advantage of this change and select courses from within the approved Faculties for their electives.

2-3) Current students may abide by the new seminar and seminar attendance requirements.

4) Current students will not be impacted by the change.

Department/School approval date (mm/dd/yy): 11/10/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/17/22
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: Engineering

Program: Master of Applied Science (MASc) in Systems Design Engineering - Nanotechnology

Program contact name(s): Eihab Abdel-Rahman

Form completed by: Sarah Landy

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

1) *Update the Seminar requirements for all MASc programs.*
2) *Update the Seminar Attendance requirements for all MASc programs.*
3) *Revise the length of program information.*

Is this a major modification to the program? No

Rationale for change(s):

1) *The updating of the seminar requirement is required to more clearly articulate the requirements for the student and update the practices of the Department which allow for seminars to occur outside of the Systems Design Engineering Graduate Colloquium.*
2) *The updating of the seminar attendance requirement is required to remove the reference to Seminar Attendance Certificates which are not currently in use by the Department.*
3) *The length of program information is being revised since the current duration listed in the GSAC is inaccurate as it references the length of the MEng in Systems Design Engineering program.*

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-systems-design-engineering/master-applied-science-masc-systems-design-engineering-nanotechnology

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

Program information
 	
• **Admit term(s)**
  ○ Fall
  ○ Winter
	Program information
	
	• **Admit term(s)**
	  ○ Fall
	  ○ Winter

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
○ Spring • **Delivery mode** ○ On-campus • **Length of program** ○ ~~The normal duration of this program is 16 months.~~ • **Program type** ○ Collaborative ○ Master's ○ Research • **Registration option(s)** ○ Full-time ○ Part-time • **Study option(s)** ○ Thesis **Degree requirements** • **Courses** ○ Students must complete 4 half credit courses (0.50 unit weight) including NANO 600 Introduction to Nanotechnology, 1 nanotechnology core course, and 2 elective courses. ○ Note: it is possible that some students may need to take additional courses to meet the specific course requirements of the collaborative program. ○ Nanotechnology core courses: ▪ NANO 601 Characterization of Nanomaterials ▪ NANO 602 Structure and Spectroscopy of Nanoscale Materials ▪ NANO 603 Nanocomposites ▪ NANO 604 Nanomechanics and Molecular Dynamics Simulations ▪ NANO 605/SYDE 683 Design of MEMS & NEMS ▪ NANO 606/SYDE 682 Advanced MicroElectroMechanical Systems: Physics, Design & Fabrication ○ Core courses are designed to provide the base knowledge and skill set required to prepare students for more	○ Spring • **Delivery mode** ○ On-campus • **Length of program** ○ Students are required to complete the program in accordance with the University program time limits. • **Program type** ○ Collaborative ○ Master's ○ Research • **Registration option(s)** ○ Full-time ○ Part-time • **Study option(s)** ○ Thesis **Degree requirements** • **Courses** ○ Students must successfully complete 4 half credit courses (0.50 unit weight) including NANO 600 Introduction to Nanotechnology, 1 nanotechnology core course, and 2 elective courses. ○ Note: it is possible that some students may need to take additional courses to meet the specific course requirements of the collaborative program. ○ Nanotechnology core courses: ▪ NANO 601 Characterization of Nanomaterials ▪ NANO 602 Structure and Spectroscopy of Nanoscale Materials ▪ NANO 603 Nanocomposites ▪ NANO 604 Nanomechanics and Molecular Dynamics Simulations ▪ NANO 605/SYDE 683 Design of MEMS & NEMS ▪ NANO 606/SYDE 682 Advanced MicroElectroMechanical Systems: Physics, Design & Fabrication ○ Core courses are designed to provide the base knowledge and skill set

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
specialized courses and to conduct interdisciplinary nanoscale research. ○ Students holding a Bachelor of Applied Science (BASc) degree in Nanotechnology Engineering or Master's degree in Nanotechnology at the University of Waterloo can not take NANO 600. Instead, they can choose 1 course from the list of nanotechnology core courses. ○ All course selections are arranged by the supervisor(s) in consultation with the student and are subject to the approval of the Associate Chair for Graduate Studies. ○ Note: these requirements are in addition to satisfactory completion of any transitional courses that may be specified at the time of admission. ○ Note: the Faculty of Engineering requires that no more than one-half of the courses used for credit toward a graduate degree may be taught by a candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule; however, the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **Nanotechnology Seminar** ○ This seminar is a forum for student presentation of research results or proposals. Invited speakers from academia and industry will also present results of research from time to time. The range of topics that will be addressed in the seminar crosses all areas of research in the collaborative program. Each student is required to present at least one research seminar. To receive credit, students are required to attend seminars according to the Department's Seminar Policy posted on the Department of Systems Design Engineering website. • **Master's Seminar** ○ Students are required to present a research seminar on their thesis at the	required to prepare students for more specialized courses and to conduct interdisciplinary nanoscale research. ○ Students holding a Bachelor of Applied Science (BASc) degree in Nanotechnology Engineering or Master's degree in Nanotechnology at the University of Waterloo can not take NANO 600. Instead, they can choose 1 course from the list of nanotechnology core courses. ○ All course selections are arranged by the supervisor(s) in consultation with the student and are subject to the approval of the Associate Chair for Graduate Studies. ○ Note: these requirements are in addition to satisfactory completion of any transitional courses that may be specified at the time of admission. ○ Note: the Faculty of Engineering requires that no more than one-half of the courses used for credit toward a graduate degree may be taught by a candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule; however, the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **Nanotechnology Seminar** ○ This seminar is a forum for student presentation of research results or proposals. Invited speakers from academia and industry will also present results of research from time to time. The range of topics that will be addressed in the seminar crosses all areas of research in the collaborative program. Each student is required to present at least one research seminar. To receive credit, students are required to attend seminars according to the Department's Seminar Policy posted on the Department of Systems Design Engineering website. • **Master's Seminar**

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Systems Design Engineering Graduate Colloquium~~. The Department will contact seminar candidates with scheduling information after they have passed their comprehensive exam~~. • **Seminar Attendance** ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term. It is the student's responsibility to ~~submit their "Seminar Attendance Certificates" attached~~ to their activity report. ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms the student has been registered as a full-time student in the Department.	○ Students are required to present a research seminar on their thesis at the Systems Design Engineering Graduate Colloquium or at a publicly attended seminar administered by their supervisor and advertised by the Department. The thesis readers should be invited to attend the seminar. ○ Note: The MASc Seminar may simultaneously count towards the Nanotechnology Seminar requirement of the Systems Design Engineering Department**.** • **Seminar Attendance** ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term and 2 per part-time term. It is the student's responsibility to attach a list of seminars attended to their activity report. ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms the student has been registered as a full-time student in the Department.

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

1-2) Current students may abide by the new seminar and seminar attendance requirements.

3) Current students will not be impacted by the change.

Department/School approval date (mm/dd/yy): 11/10/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/17/22
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: Engineering

Program: Doctor of Philosophy (PhD) in Systems Design Engineering

Program contact name(s): Eihab Abdel-Rahman

Form completed by: Sarah Landy

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

1) *Expand the elective course list to include courses from the Faculties of Engineering, Mathematics, Health, Environment, and Science.*
2) *Update the Seminar requirements for all PhD programs.*
3) *Update the Seminar Attendance requirements for all PhD programs.*
4) *Addition of a requirement for PhD students to meet with their Advisory Committee at least once per year.*
5) *Removal of the restriction on integrated theses from the GSAC.*

Is this a major modification to the program? No

Rationale for change(s):

1) *Systems Design Engineering is a department which prides itself on the interdisciplinary and diverse nature of its researchers. As such, it is appropriate to allow our graduate students to pick from a larger suite of courses to meet their elective degree requirements so that their course selection can be better tailored to their individual research plans.*
2) *The updating of the seminar requirement is required to more clearly articulate the requirements for the student and update the practices of the Department which allow for seminars to occur outside of the Systems Design Engineering Graduate Colloquium.*
3) *The updating of the seminar attendance requirement is required to remove the reference to Seminar Attendance Certificates which are not currently in use by the Department.*
4) *The addition of a requirement for PhD students to meet with their Advisory Committee at least once per year is an important part of monitoring student academic progression and providing students with timely feedback on their thesis writing and research progress.*
5) *Removing the restriction on integrated theses is in line with the University and Faculty of Engineering's guidelines on theses with co-authored content.*

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-systems-design-engineering/master-applied-science-masc-systems-design-engineering

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

Degree requirements
 	
• **Courses**
  ○ PhD candidates possessing a recent Master's degree in an appropriate discipline are required to ~~take 3~~ Engineering courses at the 600 or 700 level (with unit weights of 0.50 each). The Department may require individual candidates to take more than 3 courses. In every case, a graduate course program is established by the supervisor(s) in consultation with the student, and is subject to the approval of the Associate Chair for Graduate Studies. Candidates may also be required to take additional courses as a result of a comprehensive examination. Students pursuing one of the program's Graduate Research Fields, should inform their supervisor(s) of their chosen field(s) to ensure appropriate course selection
  ○ Candidates admitted to the PhD program who do not possess a recent and relevant Master's degree, or have transferred directly to the PhD program without a Master's degree, are required to complete a minimum of 7 courses (with a credit weight of 0.50 each) at least 5 of which must be at the 600 or 700 levels.
  ○ The Faculty of Engineering requires that no more than one-half of the courses used for credit towards a graduate degree may be taught by the candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule, but the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering.
 	
• **PhD Comprehensive Examination**
  ○ Students are required to meet the University-level PhD Comprehensive Examination minimum requirements outlined in the “Minimum requirements for the PhD degree” section of the
	Degree requirements
	
	• **Courses**
	  ○ PhD candidates possessing a recent Master's degree in an appropriate discipline are required to <u>successfully complete 3 courses - at least 2</u> Engineering courses at the 600 or 700 level <u>and at most 1 course from outside of the Faculty of Engineering but must be from the Faculties of Mathematics, Health or Science</u> (with unit weights of 0.50 each). The Department may require individual candidates to take more than 3 courses. In every case, a graduate course program is established by the supervisor(s) in consultation with the student, and is subject to the approval of the Associate Chair for Graduate Studies. Candidates may also be required to take additional courses as a result of a comprehensive examination. Students pursuing one of the program's Graduate Research Fields, should inform their supervisor(s) of their chosen field(s) to ensure appropriate course selection
	  ○ Candidates admitted to the PhD program who do not possess a recent and relevant Master's degree, or have transferred directly to the PhD program without a Master's degree, are required to complete a minimum of 7 courses (with a credit weight of 0.50 each) at least 5 of which must be at the 600 or 700 levels. <u>At least 5 course must be completed from within the Faculty of Engineering and 2 courses may be taken from outside the Faculty of Engineering but must be from the Faculties of Mathematics, Health, Environment, and/or Science.</u>
	  ○ The Faculty of Engineering requires that no more than one-half of the courses used for credit towards a graduate degree may be taught by the candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule, but the student's file must contain a statement of formal approval from the Department and endorsement

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Graduate Studies Academic Calendar (GSAC), with certain noted differences that are specific to the Faculty of Engineering Comprehensive Examination minimum requirements: ▪ Comprehensive examination purpose: Consistent with University-level minimum requirements. ▪ Timing: Students must follow the Faculty of Engineering completion timelines whereby students shall complete their comprehensive examination before the end of their 4th term or 6th term in cases where the student is admitted to the PhD program without a completed Master's degree. ▪ Committee: Students must follow the Faculty of Engineering committee composition guidelines which differ from the University-level minimum requirements in both number of committee members and committee makeup. ▪ Who Chairs an examination: Students must follow the Faculty of Engineering Chair guidelines whereby the Chair is normally selected from outside of the student's home department. ▪ Format / Content: Consistent with University-level minimum requirements but with additional information provided in the Faculty of Engineering Comprehensive Examination minimum requirements. ▪ Academic integrity: Consistent with University-level minimum requirements. • **PhD Seminar** o Students are required to present a research seminar on their thesis at the Systems Design Engineering Graduate Colloquium~~. The Department will contact seminar candidates with scheduling information after they have~~	from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **PhD Comprehensive Examination** o Students are required to meet the University-level PhD Comprehensive Examination minimum requirements outlined in the "Minimum requirements for the PhD degree" section of the Graduate Studies Academic Calendar (GSAC), with certain noted differences that are specific to the Faculty of Engineering Comprehensive Examination minimum requirements: ▪ Comprehensive examination purpose: Consistent with University-level minimum requirements. ▪ Timing: Students must follow the Faculty of Engineering completion timelines whereby students shall complete their comprehensive examination before the end of their 4th term or 6th term in cases where the student is admitted to the PhD program without a completed Master's degree. ▪ Committee: Students must follow the Faculty of Engineering committee composition guidelines which differ from the University-level minimum requirements in both number of committee members and committee makeup. ▪ Who Chairs an examination: Students must follow the Faculty of Engineering Chair guidelines whereby the Chair is normally selected from outside of the student's home department. ▪ Format / Content: Consistent with University-level minimum requirements but with additional information provided in the Faculty of Engineering Comprehensive Examination minimum requirements. ▪ Academic integrity: Consistent with University-level minimum

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

~~passed their comprehensive exam.~~
 	
• **Seminar Attendance**
  ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term. It is the student's responsibility to ~~submit their "Seminar Attendance Certificates" attached~~ to their activity report.
  ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms the student has been registered as a full-time student in the Department.
 	
• **PhD Thesis**
  ○ Students may choose to pursue up to 2 of the following Graduate Research Fields:
  ▪ Biomedical Engineering
  ▪ Human Factors and Ergonomics
  ▪ Machine Learning and Intelligence
  ▪ Mechatronic and Physical Systems
  ▪ Modelling, Simulation and Systems Theory
  ▪ Optimization and Decision Making
  ▪ Societal and Environmental Systems
  ▪ Vision, Image and Signal Processing
  ○ A Graduate Research Field is a University credential that is recognized on the student's transcript and is intended to reflect that a student has successfully completed research concentrated in the area of the Graduate Research Field. The Department, represented by the student's supervisor and examining committee, must assess whether a student's completed research warrants the field designation at the time of degree completion. To obtain the Graduate Research Field designation, a student must also complete the requirements associated with the PhD degree. Students can choose to pursue a maximum of 2 Graduate Research
	requirements.
	
	• **PhD Seminar**
	  ○ Students are required to present a research seminar on their thesis at the Systems Design Engineering Graduate Colloquium or at a publicly attended seminar administered by their supervisor and advertised by the Department. Members of the Comprehensive Examining Committee should be invited to attend the seminar.
	
	• **Seminar Attendance**
	  ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term and 2 per part-time term. It is the student's responsibility to attach a list of seminars attended to their activity report.
	  ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms the student has been registered as a full-time student in the Department.
	
	• **Annual Progress Meeting with Advisory Committee (1 and 2)**
	  ○ In the period between their comprehensive examination and their thesis defense, each PhD candidate will meet with their approved Advisory Committee on an annual basis, usually within one month of the anniversary of their comprehensive examination. This meeting is an annual milestone that must be met in order to continue in the program.
	  ○ The meeting will last no longer than one and a half hours.
	  ○ The meeting will consist of:
	  ▪ A presentation by the candidate,
	  ▪ an examination and discussion with their committee members, and
	  ▪ committee deliberations.
	  ○ The outcome of each meeting will be a recommendation from the committee in one of the following three categories:

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Field designations (1 methodology field and 1 application field) for their degree. ○ Candidates are expected to maintain continuous registration until the thesis is submitted to Graduate Studies and Postdoctoral Affairs. Under exceptional circumstances, inactive terms or a leave of absence may be requested for a prior specified period with departmental approval. The role of a supervisor is to assist a candidate in establishing a research problem with an appropriate scope, to suggest alternative general approaches to the solution of a problem and to provide general advice on the structure and content of a thesis. It is imperative that the engineering code of ethics be strictly observed in the supervisor-candidate relationship. ○ The PhD degree in the Faculty of Engineering is awarded to a candidate who has successfully completed a program of advanced study and conducted original research. The program of research and its findings must be presented in the form of a thesis and submitted to the University for public examination prior to its oral defence. ○ The writer of a thesis must demonstrate a critical awareness and understanding of the literature in the research field, exhibit a capability of defining original and useful research problems and a capability of independent thought in solving a research problem. An ability to communicate research results verbally and in writing must be shown. The University of Waterloo allows students to submit theses in English or in French, the latter being governed by certain important constraints. The principles governing the submission of theses in French are specified in the Graduate Studies Academic Calendar. The oral examination of a thesis will assess the ability of a candidate to communicate orally the results of the research and to defend the contents of the thesis. ○ Originality in a thesis may be reflected in a number of ways. A candidate may	▪ Category 1: candidate is making good progress and should continue with their plans. ▪ Category 2: candidate has made sufficient progress and must take action to improve or respond to recommendations by the committee. ▪ Category 3: candidate has made insufficient progress and remedial action is required within four months. ○ In the case, of a category 3 recommendation, the committee shall meet within one month of the deadline to make a recommendation on whether the candidate has made sufficient progress or should be Required to Withdraw from the program. • **PhD Thesis** ○ Students may choose to pursue up to 2 of the following Graduate Research Fields: ▪ Biomedical Engineering ▪ Human Factors and Ergonomics ▪ Machine Learning and Intelligence ▪ Mechatronic and Physical Systems ▪ Modelling, Simulation and Systems Theory ▪ Optimization and Decision Making ▪ Societal and Environmental Systems ▪ Vision, Image and Signal Processing ○ A Graduate Research Field is a University credential that is recognized on the student's transcript and is intended to reflect that a student has successfully completed research concentrated in the area of the Graduate Research Field. The Department, represented by the student's supervisor and examining committee, must assess whether a student's completed research warrants the field designation at the time of degree completion. To obtain the Graduate Research Field designation, a student must also complete the

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
have posed and solved an important new problem or have formulated an existing problem in a novel and useful way. A candidate may offer new and significant insights into problems examined previously by other researchers. Replications of previous investigations may be acceptable if, and only if, they incorporate [significantly new] elements in the design or execution of an experiment. ○ Objective criteria describing what is meant by a significant contribution to knowledge are difficult to specify. One way of gauging a candidate's contribution is to consider the extent to which parts of the thesis might be published in peer-reviewed technical journals with an international stature or as a monograph by an acceptable publisher. The ultimate test of the acceptability of a thesis is the ability of a candidate to satisfy, through an oral examination, to a University-appointed committee of research specialists in the general field of study, that a significant research contribution has been made and communicated adequately. ○ ~~It must be emphasized however, that a PhD thesis in the Faculty of Engineering cannot consist of a collection of technical papers that may have already been published in peer-reviewed literature. PhD theses submitted for examination in the Faculty of Engineering should be prepared in accordance with the thesis regulations published by Graduate Studies and Postdoctoral Affairs. Earlier theses should not be used as a guide, as the regulations are revised periodically. A candidate's PhD supervisor(s) should also provide important advice about the appropriate form of a PhD thesis and its content~~.	requirements associated with the PhD degree. Students can choose to pursue a maximum of 2 Graduate Research Field designations (1 methodology field and 1 application field) for their degree. ○ Candidates are expected to maintain continuous registration until the thesis is submitted to Graduate Studies and Postdoctoral Affairs. Under exceptional circumstances, inactive terms or a leave of absence may be requested for a prior specified period with departmental approval. The role of a supervisor is to assist a candidate in establishing a research problem with an appropriate scope, to suggest alternative general approaches to the solution of a problem and to provide general advice on the structure and content of a thesis. It is imperative that the engineering code of ethics be strictly observed in the supervisor-candidate relationship. ○ The PhD degree in the Faculty of Engineering is awarded to a candidate who has successfully completed a program of advanced study and conducted original research. The program of research and its findings must be presented in the form of a thesis and submitted to the University for public examination prior to its oral defence. ○ The writer of a thesis must demonstrate a critical awareness and understanding of the literature in the research field, exhibit a capability of defining original and useful research problems and a capability of independent thought in solving a research problem. An ability to communicate research results verbally and in writing must be shown. The University of Waterloo allows students to submit theses in English or in French, the latter being governed by certain important constraints. The principles governing the submission of theses in French are specified in the Graduate Studies Academic Calendar. The oral examination of a thesis will assess the ability of a candidate to communicate orally the results of the

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	research and to defend the contents of the thesis. ○ Originality in a thesis may be reflected in a number of ways. A candidate may have posed and solved an important new problem or have formulated an existing problem in a novel and useful way. A candidate may offer new and significant insights into problems examined previously by other researchers. Replications of previous investigations may be acceptable if, and only if, they incorporate [significantly new] elements in the design or execution of an experiment. ○ Objective criteria describing what is meant by a significant contribution to knowledge are difficult to specify. One way of gauging a candidate's contribution is to consider the extent to which parts of the thesis might be published in peer-reviewed technical journals with an international stature or as a monograph by an acceptable publisher. The ultimate test of the acceptability of a thesis is the ability of a candidate to satisfy, through an oral examination, to a University-appointed committee of research specialists in the general field of study, that a significant research contribution has been made and communicated adequately.

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

1) Current students would be permitted to take advantage of the course requirement change and select courses from within the approved Faculties for their electives.

2-3) Current students may abide by the new seminar and seminar attendance requirements.

4) Only new, incoming PhD students will be required to meet the Advisory Committee Meeting requirement.

5) Current students will be permitted to submit an integrated thesis should their supervisor support this and they make the necessary declarations in the thesis submission.

Department/School approval date (mm/dd/yy): 11/10/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/17/22
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: Engineering

Program: Doctor of Philosophy (PhD) in Systems Design Engineering - Aeronautics

Program contact name(s): Eihab Abdel-Rahman

Form completed by: Sarah Landy

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

1) *Expand the elective course list to include courses from the Faculties of Engineering, Mathematics, Health, Environment, and Science.*
2) *Update the Seminar requirements for all PhD programs.*
3) *Update the Seminar Attendance requirements for all PhD programs.*
4) *Addition of a requirement for PhD students to meet with their Advisory Committee at least once per year.*
5) *Removal of the restriction on integrated theses from the GSAC.*

Is this a major modification to the program? No

Rationale for change(s):

1) *Systems Design Engineering is a department which prides itself on the interdisciplinary and diverse nature of its researchers. As such, it is appropriate to allow our graduate students to pick from a larger suite of courses to meet their elective degree requirements so that their course selection can be better tailored to their individual research plans.*
2) *The updating of the seminar requirement is required to more clearly articulate the requirements for the student and update the practices of the Department which allow for seminars to occur outside of the Systems Design Engineering Graduate Colloquium.*
3) *The updating of the seminar attendance requirement is required to remove the reference to Seminar Attendance Certificates which are not currently in use by the Department.*
4) *The addition of a requirement for PhD students to meet with their Advisory Committee at least once per year is an important part of monitoring student academic progression and providing students with timely feedback on their thesis writing and research progress.*
5) *Removing the restriction on integrated theses is in line with the University and Faculty of Engineering's guidelines on theses with co-authored content.*

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-systems-design-engineering/doctor-philosophy-phd-systems-design-engineering-aeronautics

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

Degree requirements
 	
• **Courses**
  ○ PhD candidates possessing a recent Master's degree in an appropriate discipline are required to ~~take~~ AVIA 601 Interdisciplinary Aeronautics, AVIA 802 Interdisciplinary Aeronautics Project – PhD Level, and ~~2~~ Engineering courses at the 600 or 700 level (with unit weights of 0.50 each). The Department may require individual candidates to take more than 4 courses. In every case, a graduate course program is established by the supervisor(s) in consultation with the student, and is subject to the approval of the Associate Chair for Graduate Studies. Candidates may also be required to take additional courses as a result of a comprehensive examination.
  ○ Candidates admitted to the PhD program who do not possess a recent and relevant Master's degree, or have transferred directly to the PhD program without a Master's degree, are required to complete a minimum of 8 courses (with a unit weight of 0.50 each) including AVIA 601 and AVIA 802. At least 6 of the 8 courses must be at the 600 or 700 levels, ~~and~~ at least ~~5~~ of those 8 courses must be from Engineering.
  ○ This degree is offered through the Collaborative Aeronautics Program. This program, jointly offered by a range of departments/schools across several academic faculties, promotes the development of interdisciplinary perspectives on aeronautics. Collaborative Aeronautics Program students complete their specialist training in their respective home departments/schools, while working with colleagues from a variety of other departments/schools in core interdisciplinary courses (AVIA 601 and AVIA 602/802).
  ○ Students who have already completed AVIA 601 and AVIA 602 as part of their Master’s Aeronautics degree, must
	Degree requirements
	
	• **Courses**
	  ○ PhD candidates possessing a recent Master's degree in an appropriate discipline are required to <u>successfully complete</u> AVIA 601 Interdisciplinary Aeronautics, AVIA 802 Interdisciplinary Aeronautics Project – PhD Level, and 2 <u>additional courses – at least 1 Engineering course at the 600 or 700 level and at most 1 course from outside of the Faculty of Engineering but must be from the Faculties of Mathematics, Health or Science</u> (with unit weights of 0.50 each). The Department may require individual candidates to take more than 4 courses. In every case, a graduate course program is established by the supervisor(s) in consultation with the student, and is subject to the approval of the Associate Chair for Graduate Studies. Candidates may also be required to take additional courses as a result of a comprehensive examination.
	  ○ Candidates admitted to the PhD program who do not possess a recent and relevant Master's degree, or have transferred directly to the PhD program without a Master's degree, are required to complete a minimum of 8 courses (with a unit weight of 0.50 each) including AVIA 601 and AVIA 802. At least 6 of the 8 courses must be at the 600 or 700 levels, at least <u>4</u> of those 8 courses must be from Engineering, <u>and at most 2 courses may be taken from outside the Faculty of Engineering but must be from the Faculties of Mathematics, Health, Environment, and/or Science.</u>
	  ○ This degree is offered through the Collaborative Aeronautics Program. This program, jointly offered by a range of departments/schools across several academic faculties, promotes the development of interdisciplinary perspectives on aeronautics. Collaborative Aeronautics Program students complete their specialist training in their respective home

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
complete the following course requirements: ○ AVIA 802 Interdisciplinary Aeronautics Project - PhD Level ○ 1 elective graduate course that is applicable to aeronautics (approved by their supervisor with support from the Director of the Collaborative Aeronautics Program) ○ 2 Engineering courses at the 600 or 700 level (with unit weights of 0.50 each) ○ The Faculty of Engineering requires that no more than one-half of the courses used for credit towards a graduate degree may be taught by the candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule, but the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **PhD Comprehensive Examination** ○ Students are required to meet the University-level PhD Comprehensive Examination minimum requirements outlined in the “Minimum requirements for the PhD degree” section of the Graduate Studies Academic Calendar (GSAC), with certain noted differences that are specific to the Faculty of Engineering Comprehensive Examination minimum requirements: ○ Comprehensive examination purpose: Consistent with University-level minimum requirements. ○ Timing: Students must follow the Faculty of Engineering completion timelines whereby students shall complete their comprehensive examination before the end of their 4th term or 6th term in cases where the student is admitted to the PhD program without a completed Master’s degree. ○ Committee: Students must follow the Faculty of Engineering committee composition guidelines which differ from the University-level minimum requirements in both number of	departments/schools, while working with colleagues from a variety of other departments/schools in core interdisciplinary courses (AVIA 601 and AVIA 602/802). ○ Students who have already completed AVIA 601 and AVIA 602 as part of their Master’s Aeronautics degree, must complete the following course requirements: ▪ AVIA 802 Interdisciplinary Aeronautics Project - PhD Level ▪ 1 elective graduate course that is applicable to aeronautics (approved by their supervisor with support from the Director of the Collaborative Aeronautics Program) ▪ 2 Engineering courses at the 600 or 700 level (with unit weights of 0.50 each) ○ The Faculty of Engineering requires that no more than one-half of the courses used for credit towards a graduate degree may be taught by the candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule, but the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **PhD Comprehensive Examination** ○ Students are required to meet the University-level PhD Comprehensive Examination minimum requirements outlined in the “Minimum requirements for the PhD degree” section of the Graduate Studies Academic Calendar (GSAC), with certain noted differences that are specific to the Faculty of Engineering Comprehensive Examination minimum requirements: ○ Comprehensive examination purpose: Consistent with University-level minimum requirements. ○ Timing: Students must follow the Faculty of Engineering completion timelines whereby students shall complete their comprehensive

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
committee members and committee makeup. ○ Who Chairs an examination: Students must follow the Faculty of Engineering Chair guidelines whereby the Chair is normally selected from outside of the student's home department. ○ Format / Content: Consistent with University-level minimum requirements but with additional information provided in the Faculty of Engineering Comprehensive Examination minimum requirements. ○ Academic integrity: Consistent with University-level minimum requirements. • **PhD Seminar** ○ Students are required to present a research seminar on their thesis at the Systems Design Engineering Graduate Colloquium~~. The Department will contact seminar candidates with scheduling information after they have passed their comprehensive exam~~. • **Seminar Attendance** ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term. It is the student's responsibility to ~~submit their "Seminar Attendance Certificates" attached~~ to their activity report. ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms the student has been registered as a full-time student in the Department. • **PhD Thesis** ○ Candidates are expected to maintain continuous registration until the thesis is submitted to Graduate Studies and Postdoctoral Affairs. Under exceptional circumstances, inactive terms or a leave of absence may be requested for a prior specified period with departmental approval. The role of a supervisor is to assist a candidate in establishing a research problem with an appropriate scope, to suggest alternative general approaches to the	examination before the end of their 4th term or 6th term in cases where the student is admitted to the PhD program without a completed Master's degree. ○ Committee: Students must follow the Faculty of Engineering committee composition guidelines which differ from the University-level minimum requirements in both number of committee members and committee makeup. ○ Who Chairs an examination: Students must follow the Faculty of Engineering Chair guidelines whereby the Chair is normally selected from outside of the student's home department. ○ Format / Content: Consistent with University-level minimum requirements but with additional information provided in the Faculty of Engineering Comprehensive Examination minimum requirements. ○ Academic integrity: Consistent with University-level minimum requirements. • **PhD Seminar** ○ Students are required to present a research seminar on their thesis at the Systems Design Engineering Graduate Colloquium <u>or at a publicly attended seminar administered by their supervisor and advertised by the Department. Members of the Comprehensive Examining Committee should be invited to attend the seminar</u>. • **Seminar Attendance** ○ Students are required to attend an average of four University of Waterloo research seminars per full-time term <u>and 2 per part-time term</u>. It is the student's responsibility to <u>attach a list of seminars attended</u> to their activity report. ○ To earn the seminar attendance milestone, the Department records should show that the number of seminars a student has attended is, at least, four times the number of terms the student has been registered as a full-time student in the Department.

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
solution of a problem and to provide general advice on the structure and content of a thesis. It is imperative that the engineering code of ethics be strictly observed in the supervisor-candidate relationship. ○ The PhD degree in the Faculty of Engineering is awarded to a candidate who has successfully completed a program of advanced study and conducted original research. The program of research must be applicable to Systems Design Engineering and Aeronautics and its findings must be presented in the form of a thesis and submitted to the University for public examination prior to its oral defence. ○ The writer of a thesis must demonstrate a critical awareness and understanding of the literature in the research field, exhibit a capability of defining original and useful research problems and a capability of independent thought in solving a research problem. An ability to communicate research results verbally and in writing must be shown. The University of Waterloo allows students to submit theses in English or in French, the latter being governed by certain important constraints. The principles governing the submission of theses in French are specified in the Graduate Studies Academic Calendar. The oral examination of a thesis will assess the ability of a candidate to communicate orally the results of the research and to defend the contents of the thesis. ○ Originality in a thesis may be reflected in a number of ways. A candidate may have posed and solved an important new problem or have formulated an existing problem in a novel and useful way. A candidate may offer new and significant insights into problems examined previously by other researchers. Replications of previous investigations may be acceptable if, and only if, they incorporate [significantly new] elements in the design or execution of an experiment. ○ Objective criteria describing what is meant by a significant contribution to	• **Annual Progress Meeting with Advisory Committee (1 and 2)** ○ In the period between their comprehensive examination and their thesis defense, each PhD candidate will meet with their approved Advisory Committee on an annual basis, usually within one month of the anniversary of their comprehensive examination. This meeting is an annual milestone that must be met in order to continue in the program. ○ The meeting will last no longer than one and a half hours. ○ The meeting will consist of: ▪ A presentation by the candidate, ▪ an examination and discussion with their committee members, and ▪ committee deliberations. ○ The outcome of each meeting will be a recommendation from the committee in one of the following three categories: ▪ Category 1: candidate is making good progress and should continue with their plans. ▪ Category 2: candidate has made sufficient progress and must take action to improve or respond to recommendations by the committee. ▪ Category 3: candidate has made insufficient progress and remedial action is required within four months. ○ In the case, of a category 3 recommendation, the committee shall meet within one month of the deadline to make a recommendation on whether the candidate has made sufficient progress or should be Required to Withdraw from the program. • **PhD Thesis** ○ Candidates are expected to maintain continuous registration until the thesis is submitted to Graduate Studies and Postdoctoral Affairs. Under exceptional circumstances, inactive terms or a leave of absence may be requested for a prior specified period with departmental approval. The role of a supervisor is to assist a candidate in

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
knowledge are difficult to specify. One way of gauging a candidate's contribution is to consider the extent to which parts of the thesis might be published in peer-reviewed technical journals with an international stature or as a monograph by an acceptable publisher. The ultimate test of the acceptability of a thesis is the ability of a candidate to satisfy, through an oral examination, to a University-appointed committee of research specialists in the general field of study, that a significant research contribution has been made and communicated adequately. ~~o It must be emphasized however, that a PhD thesis in the Faculty of Engineering cannot consist of a collection of technical papers that may have already been published in peer-reviewed literature. PhD theses submitted for examination in the Faculty of Engineering should be prepared in accordance with the thesis regulations published by Graduate Studies and Postdoctoral Affairs. Earlier theses should not be used as a guide, as the regulations are revised periodically. A candidate's PhD supervisor(s) should also provide important advice about the appropriate form of a PhD thesis and its content.~~	establishing a research problem with an appropriate scope, to suggest alternative general approaches to the solution of a problem and to provide general advice on the structure and content of a thesis. It is imperative that the engineering code of ethics be strictly observed in the supervisor-candidate relationship. o The PhD degree in the Faculty of Engineering is awarded to a candidate who has successfully completed a program of advanced study and conducted original research. The program of research must be applicable to Systems Design Engineering and Aeronautics and its findings must be presented in the form of a thesis and submitted to the University for public examination prior to its oral defence. o The writer of a thesis must demonstrate a critical awareness and understanding of the literature in the research field, exhibit a capability of defining original and useful research problems and a capability of independent thought in solving a research problem. An ability to communicate research results verbally and in writing must be shown. The University of Waterloo allows students to submit theses in English or in French, the latter being governed by certain important constraints. The principles governing the submission of theses in French are specified in the Graduate Studies Academic Calendar. The oral examination of a thesis will assess the ability of a candidate to communicate orally the results of the research and to defend the contents of the thesis. o Originality in a thesis may be reflected in a number of ways. A candidate may have posed and solved an important new problem or have formulated an existing problem in a novel and useful way. A candidate may offer new and significant insights into problems examined previously by other researchers. Replications of previous investigations may be acceptable if, and only if, they incorporate

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	[significantly new] elements in the design or execution of an experiment. ○ Objective criteria describing what is meant by a significant contribution to knowledge are difficult to specify. One way of gauging a candidate's contribution is to consider the extent to which parts of the thesis might be published in peer-reviewed technical journals with an international stature or as a monograph by an acceptable publisher. The ultimate test of the acceptability of a thesis is the ability of a candidate to satisfy, through an oral examination, to a University-appointed committee of research specialists in the general field of study, that a significant research contribution has been made and communicated adequately.

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

1) Current students would be permitted to take advantage of the course requirement change and select courses from within the approved Faculties for their electives.

2-3) Current students may abide by the new seminar and seminar attendance requirements.

4) Only new, incoming PhD students will be required to meet the Advisory Committee Meeting requirement.

5) Current students will be permitted to submit an integrated thesis should their supervisor support this and they make the necessary declarations in the thesis submission.

Department/School approval date (mm/dd/yy): 11/10/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/17/22
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: Engineering

Program: Doctor of Philosophy (PhD) in Systems Design Engineering - Nanotechnology

Program contact name(s): Eihab Abdel-Rahman

Form completed by: Sarah Landy

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

1) *Update the Seminar requirements for all PhD programs.*
2) *Update the Seminar Attendance requirements for all PhD programs.*
3) *Addition of a requirement for PhD students to meet with their Advisory Committee at least once per year.*
4) *Removal of the restriction on integrated theses from the GSAC.*

Is this a major modification to the program? No

Rationale for change(s):

1) *The updating of the seminar requirement is required to more clearly articulate the requirements for the student and update the practices of the Department which allow for seminars to occur outside of the Systems Design Engineering Graduate Colloquium.*
2) *The updating of the seminar attendance requirement is required to remove the reference to Seminar Attendance Certificates which are not currently in use by the Department.*
3) *The addition of a requirement for PhD students to meet with their Advisory Committee at least once per year is an important part of monitoring student academic progression and providing students with timely feedback on their thesis writing and research progress.*
4) *Removing the restriction on integrated theses is in line with the University and Faculty of Engineering's guidelines on theses with co-authored content.*

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-systems-design-engineering/doctor-philosophy-phd-systems-design-engineering-nanotechnology

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

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

• **Courses**
  ○ For the PhD program, students who are admitted with an appropriate masters degree must complete 3 half credit courses (0.50 unit weight) at the 600 or 700 level including NANO 600 Introduction to Nanotechnology, 1 nanotechnology core course, and 1 elective course.
  ○ Students admitted with an appropriate honours bachelor's degree or who transfer directly from a masters program to the PhD program must complete 7 half credit courses (0.50 unit weight) including NANO 600 Introduction to Nanotechnology, 1 nanotechnology core course, and 5 elective courses.
  ○ Note: it is possible that some students may need to take additional courses to meet the specific course requirements of the collaborative program.
  ○ Nanotechnology core courses:
  ▪ NANO 601 Characterization of Nanomaterials
  ▪ NANO 602 Structure and Spectroscopy of Nanoscale Materials
  ▪ NANO 603 Nanocomposites
  ▪ NANO 604 Nanomechanics and Molecular Dynamics Simulations
  ▪ NANO 605/SYDE 683 Design of MEMS & NEMS
  ▪ NANO 606/SYDE 682 Advanced MicroElectroMechanical Systems: Physics, Design & Fabrication
  ○ Core courses are designed to provide the base knowledge and skill set required to prepare students for more specialized courses and to conduct interdisciplinary nanoscale research.
  ○ Students holding a Bachelor of Applied Science (BASc) degree in Nanotechnology Engineering or Master's degree in Nanotechnology at the University of Waterloo can not take NANO 600. Instead, they can choose 1 course from the list of nanotechnology core courses.
	• **Courses**
	  ○ For the PhD program, students who are admitted with an appropriate masters degree must <u>successfully</u> complete 3 half credit courses (0.50 unit weight) at the 600 or 700 level including NANO 600 Introduction to Nanotechnology, 1 nanotechnology core course, and 1 elective course.
	  ○ Students admitted with an appropriate honours bachelor's degree or who transfer directly from a masters program to the PhD program must <u>successfully</u> complete 7 half credit courses (0.50 unit weight) including NANO 600 Introduction to Nanotechnology, 1 nanotechnology core course, and 5 elective courses.
	  ○ Note: it is possible that some students may need to take additional courses to meet the specific course requirements of the collaborative program.
	  ○ Nanotechnology core courses:
	  ▪ NANO 601 Characterization of Nanomaterials
	  ▪ NANO 602 Structure and Spectroscopy of Nanoscale Materials
	  ▪ NANO 603 Nanocomposites
	  ▪ NANO 604 Nanomechanics and Molecular Dynamics Simulations
	  ▪ NANO 605/SYDE 683 Design of MEMS & NEMS
	  ▪ NANO 606/SYDE 682 Advanced MicroElectroMechanical Systems: Physics, Design & Fabrication
	  ○ Core courses are designed to provide the base knowledge and skill set required to prepare students for more specialized courses and to conduct interdisciplinary nanoscale research.
	  ○ Students holding a Bachelor of Applied Science (BASc) degree in Nanotechnology Engineering or Master's degree in Nanotechnology at the University of Waterloo can not take NANO 600. Instead, they can choose 1 course from the list of nanotechnology core courses.

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
○ A graduate course program is established by the supervisor(s) in consultation with the student, and is subject to the approval of the Associate Chair for Graduate Studies. Candidates may also be required to take additional courses as a result of a comprehensive examination. ○ Candidates admitted to the PhD program who do not possess a recent and relevant Master's degree, or have transferred directly to the PhD program without a Master's degree, are required to complete a minimum of 7 courses (with a credit weight of 0.50 each) at least 5 of which must be at the 600 or 700 levels. ○ The Faculty of Engineering requires that no more than one-half of the courses used for credit towards a graduate degree may be taught by the candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule, but the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **PhD Comprehensive Examination** ○ Students are required to meet the University-level PhD Comprehensive Examination minimum requirements outlined in the “Minimum requirements for the PhD degree” section of the Graduate Studies Academic Calendar (GSAC), with certain noted differences that are specific to the Faculty of Engineering Comprehensive Examination minimum requirements: ○ Comprehensive examination purpose: Consistent with University-level minimum requirements. ○ Timing: Students must follow the Faculty of Engineering completion timelines whereby students shall complete their comprehensive examination before the end of their 4th term or 6th term in cases where the student is admitted to the PhD program without a completed Master’s degree.	○ A graduate course program is established by the supervisor(s) in consultation with the student, and is subject to the approval of the Associate Chair for Graduate Studies. Candidates may also be required to take additional courses as a result of a comprehensive examination. ○ Candidates admitted to the PhD program who do not possess a recent and relevant Master's degree, or have transferred directly to the PhD program without a Master's degree, are required to <u>successfully</u> complete a minimum of 7 courses (with a credit weight of 0.50 each) at least 5 of which must be at the 600 or 700 levels. ○ The Faculty of Engineering requires that no more than one-half of the courses used for credit towards a graduate degree may be taught by the candidate's supervisor(s). In the case of co-supervision in small research groups, it may be necessary to relax this rule, but the student's file must contain a statement of formal approval from the Department and endorsement from the Associate Dean for Graduate Studies and Research in the Faculty of Engineering. • **PhD Comprehensive Examination** ○ Students are required to meet the University-level PhD Comprehensive Examination minimum requirements outlined in the “Minimum requirements for the PhD degree” section of the Graduate Studies Academic Calendar (GSAC), with certain noted differences that are specific to the Faculty of Engineering Comprehensive Examination minimum requirements: ○ Comprehensive examination purpose: Consistent with University-level minimum requirements. ○ Timing: Students must follow the Faculty of Engineering completion timelines whereby students shall complete their comprehensive examination before the end of their 4th term or 6th term in cases where the student is admitted to the PhD program without a completed Master’s degree.

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
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Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
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Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
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Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
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How will students currently registered in the program be impacted by these changes?

1-2) Current students may abide by the new seminar and seminar attendance requirements.

3) Only new, incoming PhD students will be required to meet the Advisory Committee Meeting requirement.

4) Current students will be permitted to submit an integrated thesis should their supervisor support this and they make the necessary declarations in the thesis submission.

Department/School approval date (mm/dd/yy): 11/10/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/17/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Engineering

Effective date: Term: Spring Year: 2023

Milestone

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

☒ New: Choose an item. Annual Progress Meeting with Advisory Committee 1

☐ Inactivate: Choose an item.

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

Course

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

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: Choose an item.

Course number:

Course ID:

Course title (max. 100 characters including spaces):

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

Grading basis: Choose an item.

Course credit weight: Choose an item.

Course consent required: Choose an item.

Course description:

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

Primary meet type: Choose an item.

Delivery mode: Choose an item.

Requisites:

Special topics course: Yes ☐ No ☐

Cross-listed course: Yes ☐ No ☐

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

Sections combined/held with:

Rationale for request:

The addition of a requirement for PhD students to meet with their advisory committee at least once per year is an important part of monitoring a student academic progression and providing students with timely feedback on their thesis writing and research progress.

Please add the "Annual Progress Meeting with Advisory Committee 1" milestone to the programs listed below:

1) *Doctor of Philosophy (PhD) in Systems Design Engineering*
2) *Doctor of Philosophy (PhD) in Systems Design Engineering - Aeronautics*
3) *Doctor of Philosophy (PhD) in Systems Design Engineering - Nanotechnology*

Form completed by: Sarah Landy
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/18/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Engineering

Effective date: Term: Spring Year: 2023

Milestone

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

☒ New: Choose an item. Annual Progress Meeting with Advisory Committee 2

☐ Inactivate: Choose an item.

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

Course

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

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: Choose an item.

Course number:

Course ID:

Course title (max. 100 characters including spaces):

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

Grading basis: Choose an item.

Course credit weight: Choose an item.

Course consent required: Choose an item.

Course description:

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

Primary meet type: Choose an item.

Delivery mode: Choose an item.

Requisites:

Special topics course: Yes ☐ No ☐

Cross-listed course: Yes ☐ No ☐

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

Sections combined/held with:

Rationale for request:

The addition of a requirement for PhD students to meet with their advisory committee at least once per year is an important part of monitoring a student academic progression and providing students with timely feedback on their thesis writing and research progress.

Please add the "Annual Progress Meeting with Advisory Committee 2" milestone to the programs listed below:

1) *Doctor of Philosophy (PhD) in Systems Design Engineering*
2) *Doctor of Philosophy (PhD) in Systems Design Engineering - Aeronautics*
3) *Doctor of Philosophy (PhD) in Systems Design Engineering - Nanotechnology*

Form completed by: Sarah Landy
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☐ date (mm/dd/yy):
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

From: **Admin Council (January 11, 2023)**

To: **Senate Graduate Research Council (February 13, 2023)**

Graduate calendar changes for Faculty of Health

1. PROGRAM CHANGES

1.1 School of Public Health Sciences* effective Fall 2023

1.1.1 **Motion:** Adding a Master's Thesis Proposal milestone to the degree requirements and updating the Thesis milestone description.

Rationale: MSc students must undergo a thesis proposal examination that is normally held at the end of term 3, or beginning of term 4, in the program. Students cannot go on and defend their MSc thesis until they have passed the thesis proposal examination. Currently, the thesis proposal examination is not an official milestone of the program. We are seeking to emphasize the importance of the examination by adding it as a milestone to the degree requirements.

1.1.2 **Motion:** Adding a PhD Thesis Proposal milestone to the degree requirements and updating the Thesis milestone description.

Rationale: PhD students must undergo a thesis proposal examination that is normally held at the end of term 6, or beginning of term 7, in the program. Students cannot go on and defend their PhD thesis until they have passed the thesis proposal examination. Currently, the thesis proposal examination is not an official milestone of the program. We are seeking to emphasize the importance of the examination by adding it as a milestone to the degree requirements.

1.2 Master of Social Work* effective Fall 2023

1.2.1 **Motion:** Removing the statistics requirement from the minimum admission requirements.

Rationale: The School of Social Work undertook a major review of its Master of Social Work (MSW) admissions process in 2018-19, including the MSW admissions requirements. The inclusion of a statistics course as an admission requirement was determined to be misaligned with the MSW program that mostly engages qualitative inquiries and research methodologies. While quantitative inquiries and research methodologies may be included in some course content, a course in statistics is not required in order to engage the key learning elements. The proposed change includes removing the following admission requirement: one full-course equivalent in Research Methodology and Statistics; that is, a half course in Research Methodology and a half course in Statistics, or one full course which includes both. Instead, the admission requirement will be: a half course in Research Methodology.

1.3 Kinesiology* effective Spring 2023

1.3.1 **Motion:** Updating the MKin degree requirements to include two new Graduate Specializations.

This item for consideration on SGRC Regular Agenda

Rationale: The Department of Kinesiology and Health Sciences (KHS) currently offers a wide range of courses to meet its graduate program requirements. Students within the Master of Kinesiology (MKin) course-based

program are permitted to (and typically do) bundle specific courses together with common themes. The proposed change would formalize this common practice to allow students to obtain a recognized "Graduate Specialization" when they graduate.

At UW, Graduate Specializations refer to areas of concentration related to the collective strengths of the program's faculty and staff. Based on consultations with a host of stakeholders (including students, industry and policy-related partners), there is perceived value in adding Graduate Specialization options within the MKin program to recognize a specific area of expertise on student transcripts. This will assist with recruitment of potential incoming students, and support programming decisions by the department. In addition, this recognition will enhance the marketability of graduates by signifying to employers that graduates have a specific area of expertise beyond the broad knowledge expectations of their degrees.

The proposed Graduate Specializations have been crafted such that each contributes towards the certification requirements for career-relevant regulatory bodies (e.g. Canadian College for the Certification of Professional Ergonomists, Canadian Society for Exercise Physiology, College of Kinesiologists of Ontario).

This proposal aligns with recently initiated Graduate Research Fields for thesis-based graduate students in the Department of Kinesiology and Health Sciences.

2. COURSE CHANGES

2.1 School of Public Health Sciences* effective Fall 2023

2.1.1 **Motion:** Removing HLTH 636 from the course catalogue.

Rationale: This course has not been taught for some time and is no longer needed in the Master of Public Health (MPH) curriculum. Much of the content of this course has been moved to HLTH 634. HLTH 636 may therefore be removed from the course catalog.

2.2 Master of Social Work* effective Spring 2023

2.2.1 **Motion: Removing Department consent requirement from SWK 653K.**

Rationale: In the previous course revision process, department consent was listed as being required. The course does not require department consent.

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: Health

Program: Master of Science (MSc) in Public Health Sciences

Program contact name(s): Mark Oremus

Form completed by: Mark Oremus

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

Adding a Master's Thesis Proposal milestone to the degree requirements and updating the Thesis milestone description.

Is this a major modification to the program? No

Rationale for change(s):

MSc students must undergo a thesis proposal examination that is normally held at the end of term 3, or beginning of term 4, in the program. Students cannot go on and defend their MSc thesis until they have passed the thesis proposal examination. Currently, the thesis proposal examination is not an official milestone of the program. We are seeking to emphasize the importance of the examination by adding it as a milestone to the degree requirements.

Proposed effective date: Term: Fall Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/applied-health-sciences/school-public-health-sciences/master-science-msc-public-health-sciences

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements • **Master's Thesis** ○ For the Master's thesis, ~~an approved topic is required and will be~~ defended in an oral examination. ~~The MSc thesis committee consists of a minimum of three faculty and includes the student's supervisor, appointed in the School, and at least one other member of the School of Public Health Sciences~~	**Degree requirements** • **Master's Thesis Proposal** ○ Students must identify an approved topic for their Master's thesis, write a thesis proposal describing the topic, and defend the proposal in an oral examination normally held at the midpoint of the degree. Students are expected to identify a Master's thesis committee in advance of their thesis

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
~~faculty. One committee member may be from outside the School (whether from within the university or from another university). The composition of the Thesis Advisory Committee must be approved by the School's Graduate Committee.~~	proposal examination. The thesis committee will consist of a minimum of three people, including a supervisor and at least one other faculty member who are both appointed in the School of Public Health Sciences. One committee member may be from outside the School (from within the University or from another university). • **Master's Thesis** o For the Master's thesis, the research described in the thesis proposal will be undertaken and defended in an oral examination.

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

Currently registered students will not be impacted by the change. All students in the program already undergo a thesis proposal examination at some point prior to defending their MSc thesis dissertation. The proposal examination normally happens at the end of term 3 or the start of term 4, although adjustments to this timeline are permitted to account for the nuances of each student's course of graduate study. We do not permit students to defend their MSc thesis until they successfully complete the thesis proposal examination.

Department/School approval date (mm/dd/yy): 11/18/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/09/22
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: Health

Program: Master of Science (MSc) in Public Health Sciences - Water

Program contact name(s): Mark Oremus

Form completed by: Mark Oremus

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

Adding a Master's Thesis Proposal milestone to the degree requirements and updating the Thesis milestone description.

Is this a major modification to the program? No

Rationale for change(s):

MSc students must undergo a thesis proposal examination that is normally held at the end of term 3, or beginning of term 4, in the program. Students cannot go on and defend their MSc thesis until they have passed the thesis proposal examination. Currently, the thesis proposal examination is not an official milestone of the program. We are seeking to emphasize the importance of the examination by adding it as a milestone to the degree requirements.

Proposed effective date: Term: Fall Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/applied-health-sciences/school-public-health-sciences/master-science-msc-public-health-sciences-water

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements • **Master's Thesis** ○ For the Master's thesis, ~~an approved topic is required and will be~~ defended in an oral examination. ~~The MSc thesis committee consists of a minimum of supervisor, appointed in the School, and at least one other member of the School of Public Health Sciences faculty. One committee member may~~	**Degree requirements** • **Master's Thesis Proposal** ○ Students must identify an approved topic for their Master's thesis, write a thesis proposal describing the topic, and defend the proposal in an oral examination normally held at the midpoint of the degree. Students are expected to identify a Master's thesis committee in advance of their thesis

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
~~be from outside the School (whether from within the university or from another university). The composition of the Thesis Advisory Committee must be approved by the School's Graduate Committee.~~	proposal examination. The thesis committee will consist of a minimum of three people, including a supervisor and at least one other faculty member who are both appointed in the School of Public Health Sciences. One committee member may be from outside the School (from within the University or from another university). • **Master's Thesis** o For the Master's thesis, the research described in the thesis proposal will be undertaken and defended in an oral examination.

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

Currently registered students will not be impacted by the change. All students in the program already undergo a thesis proposal examination at some point prior to defending their MSc thesis dissertation. The proposal examination normally happens at the end of term 3 or the start of term 4, although adjustments to this timeline are permitted to account for the nuances of each student's course of graduate study. We do not permit students to defend their MSc thesis until they successfully complete the thesis proposal examination.

Department/School approval date (mm/dd/yy): 11/18/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/10/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

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

Faculty: Health

Effective date: Term: Fall Year: 2023

Milestone

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

☒ New: Master's Thesis Proposal

☐ Inactivate: Choose an item.

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

Course

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

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: Choose an item.

Course number:

Course ID:

Course title (max. 100 characters including spaces):

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

Grading basis: Choose an item.

Course credit weight: Choose an item.

Course consent required: Choose an item.

Course description:

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

Primary meet type: Choose an item.

Delivery mode: Choose an item.

Requisites:

Special topics course: Yes ☐ No ☐

Cross-listed course: Yes ☐ No ☐

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

Sections combined/held with:

Rationale for request:

Please see attached program revision template for the rationale.

Please add the “Master’s Thesis Proposal” milestone to the programs listed below:

1) Master of Science (MSc) in Public Health Sciences
2) Master of Science (MSc) in Public Health Sciences - Water

Form completed by:
Department/School approval date (mm/dd/yy): 11/18/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/10/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

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: Health

Program: 1) Doctor of Philosophy (PhD) in Public Health Sciences

2) Doctor of Philosophy (PhD) in Public Health Sciences - Aging, Health and Well-Being

3) Doctor of Philosophy (PhD) in Public Health Sciences - Water

Program contact name(s): Mark Oremus

Form completed by: Mark Oremus

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

Adding a PhD Thesis Proposal milestone to the degree requirements and updating the Thesis milestone description.

Is this a major modification to the program? No

Rationale for change(s):

PhD students must undergo a thesis proposal examination that is normally held at the end of term 6, or beginning of term 7, in the program. Students cannot go on and defend their PhD thesis until they have passed the thesis proposal examination. Currently, the thesis proposal examination is not an official milestone of the program. We are seeking to emphasize the importance of the examination by adding it as a milestone to the degree requirements.

Proposed effective date: Term: Fall Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/applied-health-sciences/school-public-health-sciences/doctor-philosophy-phd-public-health-sciences

https://uwaterloo.ca/graduate-studies-academic-calendar/applied-health-sciences/school-public-health-sciences/doctor-philosophy-phd-public-health-sciences-aging-health-and-well-being

https://uwaterloo.ca/graduate-studies-academic-calendar/applied-health-sciences/school-public-health-sciences/doctor-philosophy-phd-public-health-sciences-water

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements • **PhD Thesis**	**Degree requirements** • **PhD Thesis Proposal**

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
○ ~~A PhD thesis on an approved topic is required, which is to be~~ defended in an oral examination~~.~~ The research ~~is to~~ be conducted under the supervision of the student's supervisor and the advisory committee. ~~The PhD thesis advisory committee consists of at least three members, with the supervisor and at least one other committee member being faculty from within the School of Public Health Sciences. The proposal will be defended before the thesis committee; however,~~ upon completion of the thesis, the final document will be defended before a ~~five person~~ Examination ~~Board~~.	○ Students must identify an approved topic for their PhD thesis, write a thesis proposal describing the topic, and defend the proposal in an oral examination normally held at the midpoint of the degree. Students are expected to identify a PhD thesis advisory committee in advance of their thesis proposal examination. This committee consists of at least three members, with the supervisor and at least one other committee member being faculty from within the School of Public Health Sciences. The proposal will be defended in an oral examination before the thesis advisory committee. • **PhD Thesis** ○ For the PhD thesis, the research described in the thesis proposal will be undertaken and defended in an oral examination. The research will be conducted under the supervision of the student's supervisor and the thesis advisory committee. Upon completion of the thesis, the final document will be defended orally before an Examination Committee.

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

Currently registered students will not be impacted by the change. All students in the program already undergo a thesis proposal examination at some point prior to defending their PhD thesis dissertation. The proposal examination normally happens at the end of term 6 or the start of term 7, although adjustments to this timeline are permitted to account for the nuances of each student's course of graduate study. We do not permit students to defend their PhD thesis until they successfully complete the thesis proposal examination.

Department/School approval date (mm/dd/yy): 11/18/22

Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/09/22

Faculty approval date (mm/dd/yy):

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

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

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

Faculty: Health

Effective date: Term: Fall Year: 2023

Milestone

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

☒ New: PhD Thesis Proposal

☐ Inactivate: Choose an item.

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

Course

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

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: Choose an item.

Course number:

Course ID:

Course title (max. 100 characters including spaces):

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

Grading basis: Choose an item.

Course credit weight: Choose an item.

Course consent required: Choose an item.

Course description:

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

Primary meet type: Choose an item.

Delivery mode: Choose an item.

Requisites:

Special topics course: Yes ☐ No ☐

Cross-listed course: Yes ☐ No ☐

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

Sections combined/held with:

Rationale for request:

Please see attached program revision template for the rationale.

Please add the “PhD Thesis Proposal” milestone to the programs listed below:

1) Doctor of Philosophy (PhD) in Public Health Sciences
2) Doctor of Philosophy (PhD) in Public Health Sciences - Aging, Health and Well-Being
3) Doctor of Philosophy (PhD) in Public Health Sciences - Water

Form completed by:
Department/School approval date (mm/dd/yy): 11/18/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/10/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

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: Health

Program: Master of Social Work (MSW)

Program contact name(s): Dr. Trish Van Katwyk

Form completed by: Dr. Trish Van Katwyk

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

1) *Removing the statistics requirement from the minimum admission requirements*

Is this a major modification to the program? No

Rationale for change(s):

1) *The School of Social Work undertook a major review of its Master of Social Work (MSW) admissions process in 2018-19, including the MSW admissions requirements. The inclusion of a statistics course as an admission requirement was determined to be misaligned with the MSW program that mostly engages qualitative inquiries and research methodologies. While quantitative inquiries and research methodologies may be included in some course content, a course in statistics is not required in order to engage the key learning elements. The proposed change includes removing the following admission requirement: one full-course equivalent in Research Methodology and Statistics; that is, a half course in Research Methodology and a half course in Statistics, or one full course which includes both. Instead, the admission requirement will be: a half course in Research Methodology.*

Proposed effective date: Term: Fall Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/faculty-health/school-social-work-renison-university-college/master-social-work-msw

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

Admission requirements
 	
• **Minimum requirements**
  ○ Minimum 75% average in the final two years of study (equivalent to last 20 half-credit courses).
	Admission requirements
	
	• **Minimum requirements**
	  ○ Minimum 75% average in the final two years of study (equivalent to last 20 half-credit courses).

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
○ Completion of a Bachelor of Social Work (BSW) degree from an accredited Social Work program. If an applicant's BSW degree is from a country other than Canada, the applicant is required to show proof that their degree is recognized as being equivalent to a Canadian Bachelor of Social Work Degree. ○ Successful completion of ~~one full course equivalent in Research Methodology and Statistics; that is,~~ a half course in Research Methodology ~~and a half course in Statistics, or one full course which includes both~~. There is no specific minimum mark	○ Completion of a Bachelor of Social Work (BSW) degree from an accredited Social Work program. If an applicant's BSW degree is from a country other than Canada, the applicant is required to show proof that their degree is recognized as being equivalent to a Canadian Bachelor of Social Work Degree. ○ Successful completion of a half course in Research Methodology. There is no specific minimum mark requirement.

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

Students currently registered in the program will not be impacted by these changes.

Department/School approval date (mm/dd/yy): 12/15/21
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 01/13/22
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

This item for consideration on SGRC Regular Agenda

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: Health

Program: Master of Kinesiology (MKin)

Program contact name(s): Andrew Laing, Alicia Nadon

Form completed by: Andrew Laing, Alicia Nadon

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

Updating the MKin degree requirements to include two new Graduate Specializations.

Is this a major modification to the program? Yes

Rationale for change(s):

The Department of Kinesiology and Health Sciences (KHS) currently offers a wide range of courses to meet its graduate program requirements. Students within the Master of Kinesiology (MKin) course-based program are permitted to (and typically do) bundle specific courses together with common themes. The proposed change would formalize this common practice to allow students to obtain a recognized "Graduate Specialization" when they graduate.

At UW, Graduate Specializations refer to areas of concentration related to the collective strengths of the program's faculty and staff. Based on consultations with a host of stakeholders (including students, industry and policy-related partners), there is perceived value in adding Graduate Specialization options within the MKin program to recognize a specific area of expertise on student transcripts. This will assist with recruitment of potential incoming students, and support programming decisions by the department. In addition, this recognition will enhance the marketability of graduates by signifying to employers that graduates have a specific area of expertise beyond the broad knowledge expectations of their degrees.

The proposed Graduate Specializations have been crafted such that each contributes towards the certification requirements for career-relevant regulatory bodies (e.g. Canadian College for the Certification of Professional Ergonomists, Canadian Society for Exercise Physiology, College of Kinesiologists of Ontario).

This proposal aligns with recently initiated Graduate Research Fields for thesis-based graduate students in the Department of Kinesiology and Health Sciences.

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/applied-health-sciences/department-kinesiology-and-health-sciences/master-kinesiology-mkin

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements • **Graduate Academic Integrity Module (Graduate AIM)** • **Courses** o Completion of a minimum of 4.00 units of graduate courses (e.g., 8 courses each at a 0.50 unit weight). Of the courses, at least 0.50 units must be related to quantitative or qualitative analysis, such as research methods, modelling, mathematics, or statistics. In addition, a minimum of 2.00 units must be from the Department of Kinesiology and Health Sciences. All graduate courses must be assigned a numerical grade. Students must obtain an average of at least 75% in the set of courses which they present in fulfilment of course requirements. A grade below 70% on any individual course or an average below 75% on the set of courses for the degree will result in a review of the student's status by the Department Graduate Committee. If a student receives a grade in any individual course below 60%, the Department Graduate Committee review may result in the requirement to withdraw from the program. If the student is permitted to proceed, any course with a grade below 60% will not be eligible towards the degree requirements, thus requiring the course to be repeated or additional course work to be completed. • **Master's Seminar** o Students are required to complete a series of academic and discipline-specific seminars throughout their program of study. • **Graduate Studies Practicum** o Complete the Graduate Studies Practicum milestone.	**Graduate specializations** • Human Factors and Ergonomics (HFE) • Movement and Exercise Sciences (MES) **Degree requirements** • **Graduate Academic Integrity Module (Graduate AIM)** • **Courses** o Completion of a minimum of 4.00 units of graduate courses (e.g., 8 courses each at a 0.50 unit weight). Of the courses, at least 0.50 units must be related to quantitative or qualitative analysis, such as research methods, modelling, mathematics, or statistics. In addition, a minimum of 2.00 units must be from the Department of Kinesiology and Health Sciences. All graduate courses must be assigned a numerical grade. Students must obtain an average of at least 75% in the set of courses which they present in fulfilment of course requirements. A grade below 70% on any individual course or an average below 75% on the set of courses for the degree will result in a review of the student's status by the Department Graduate Committee. If a student receives a grade in any individual course below 60%, the Department Graduate Committee review may result in the requirement to withdraw from the program. If the student is permitted to proceed, any course with a grade below 60% will not be eligible towards the degree requirements, thus requiring the course to be repeated or additional course work to be completed. o Students in the MKin program may choose to pursue one of the following Graduate Specializations:

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
○ The practicum requirement is met with a one-term, full-time, program-relevant internship/experiential placement (minimum of 420 hours) to be arranged by the student in consultation with the Department Graduate Committee. The placement, objectives, and work required to meet these objectives are to be approved by the Department Graduate Committee and the placement supervisor. ○ Submit a discussion paper or case series related to the internship/experiential placement to the Department Graduate Committee. • **Graduate Studies Colloquium** ○ Complete the Graduate Studies Colloquium milestone. ○ Integrate the training they received through their coursework and experiential practicum, and discuss in a seminar setting how this could be applied to a health or kinesiology-related issue. • **Other requirements** ○ Meet with the Department Graduate Committee periodically to discuss course selection and program progress.	1. Human Factors and Ergonomics (HFE) 2. Movement and Exercise Sciences (MES) ○ 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 associated with the MKin degree and the requirements associated with the Graduate Specialization. Students will be limited to one Graduate Specialization designation for their MKin degree. ○ All MKin Graduate Specializations consist of a minimum of 4 graduate level courses (worth a minimum of 2.0 credits) and this set is comprised of a mix of required and elective courses. Required 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. ○ For any of the Graduate Specializations below, an equivalent course focused on the Graduate Specialization may replace a required or elective course, with the approval of the Department Graduate Officer. ○ The requirements for each of the Graduate Specializations are described below. ○ 1. Graduate Specialization in Human Factors and Ergonomics

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
	○ To receive the Graduate Specialization in Human Factors and Ergonomics, students must successfully complete 6 required courses (worth a total of 2.5 credits): ▪ Required course(s): ▪ KIN 620 – Physical Ergonomics (0.5) ▪ KIN 623 – Organizational Ergonomics (0.5) ▪ KIN 622 – Professional Practice in HFE (0.25) ▪ KIN 622L – Professional Practice in HFE Lab (0.25) ▪ KIN 621 – Design, Modeling & Simulation in HFE (0.5 credit) ▪ KIN 686 – Human Computer Interaction (0.5 credit) ○ 2. Graduate Specialization in Movement and Exercise Sciences ○ To receive the Graduate Specialization in Movement and Exercise Sciences, students must successfully complete 3 required course(s) and 1 elective course(s) (worth a total of 2.0 credits): ▪ Required courses: ▪ KIN 655 Theory and Practice of Movement Assessment (0.5) ▪ KIN 691 Theory and Practice of Cardiorespiratory Assessment (0.5) ▪ KIN 693 Theory and Practice of Exercise Programming (0.5) ▪ Elective course 1 (choose 1 from the following list): ▪ KIN 605 Nutrition and Exercise in Health and Performance ▪ KIN 658 Physical Activity and Cognition (0.5) ▪ KIN 688 Selected Topics in Kinesiology (0.5)

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

	• **Master's Seminar**
	  ○ Students are required to complete a series of academic and discipline-specific seminars throughout their program of study.
	
	• **Graduate Studies Practicum**
	  ○ Complete the Graduate Studies Practicum milestone.
	  ○ The practicum requirement is met with a one-term, full-time, program-relevant internship/experiential placement (minimum of 420 hours) to be arranged by the student in consultation with the Department Graduate Committee. The placement, objectives, and work required to meet these objectives are to be approved by the Department Graduate Committee and the placement supervisor.
	  ○ To receive the Graduate Specialization in Human Factors and Ergonomics, students must successfully complete their practicum in a domain related to human factors and/or ergonomics.
	  ○ To receive the Graduate Specialization in Movement and Exercise Sciences, students must successfully complete their practicum in a domain related to movement and/or exercise sciences.
	  ○ Submit a discussion paper or case series related to the internship/experiential placement to the Department Graduate Committee.
	
	• **Graduate Studies Colloquium**
	  ○ Complete the Graduate Studies Colloquium milestone.
	  ○ Integrate the training they received through their coursework and experiential practicum, and discuss in a seminar setting how this could be applied to a health or kinesiology-related issue.
	
	• **Other requirements**
	  ○ Meet with the Department Graduate Committee periodically to discuss course selection and program progress.

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

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

Students currently registered in the MKin program will be able to obtain one of the Graduate Specialization designations if they fulfill the applicable degree requirements.

Department/School approval date (mm/dd/yy): 11/30/22

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

Faculty approval date (mm/dd/yy):

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

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

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Health

Effective date: Term: Fall Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☐ New: Complete all course elements below

☒ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: HLTH

Course number: 636

Course ID: 012541

Course title (max. 100 characters including spaces): Applied Epidemiology: Advanced Concepts and Applications for Public Health

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: This course employs a case-study approach to demonstrate methods for investigation and control of communicable disease outbreaks and clusters of chronic diseases and injuries. Course open to MPH students. Others may be admitted with consent of instructor.

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

Primary meet type: Lecture

Delivery mode: Only offered online

Requisites: SPHS students only / Prereq: PHS 606 or HSG 606 or HLTH 606B or HLTH 606A

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

This course has not been taught for some time and is no longer needed in the Master of Public Health (MPH) curriculum. Much of the content of this course has been moved to HLTH 634. HLTH 636 may therefore be removed from the course catalog.

Form completed by: Mark Oremus
Department/School approval date (mm/dd/yy): 12/09/22
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 11/21/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

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

Faculty: Health

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☒ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Removing Department consent requirement.

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

Course subject code: SWK

Course number: 653R

Course ID: 015169

Course title (max. 100 characters including spaces): Grief and Palliative Care in Social Work

Course short title (max. 30 characters including spaces): Grief and Palliative Care in SW

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: Grief is a part of the human experience that often occurs when a person dies. Social workers should be familiar with the concept for all aspects of practice. Palliative care is a model of health care for people with terminal illnesses, along with their families, in order to relieve suffering and improve quality of life. Palliative care is delivered by an interprofessional team which is most often comprised of medicine, nursing, social work

and chaplaincy; other professions are often involved such as pharmacy, occupational therapy and others. This course addresses the social work role in grief and palliative care. (Note: This is an online course).

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

Primary meet type: Lecture

Delivery mode: Only offered online

Requisites: SWK Master's Students Only

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with: N/A

Rationale for request:

In the previous course revision process, department consent was listed as being required. The course does not require department consent.

Form completed by: Dr. Trish Van Katwyk
Department/School approval date (mm/dd/yy): 06/15/2022
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 06/29/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

UNIVERSITY OF WATERLOO | Graduate Studies and Postdoctoral Affairs

January 30, 2023

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

FROM: Heidi Mussar, Associate Director, Graduate Financial Aid & Awards

RE: Agenda items for Senate Graduate & Research Council – February 2023

Items for Approval

a) OAA Award for Exceptional Leadership Through Design Excellence – trust

Four awards, valued at $2,500 each, will be provided annually to full-time undergraduate or graduate students in any year in the School of Architecture who have demonstrated exceptional leadership through design excellence. Students will be invited to apply through the School of Architecture during the Spring term. This fund is made possible by a donation from the Ontario Association of Architecture (OAA).

The period of this defined term award will be from 2023 to 2027. The first selection will be made in Spring 2023 and the last in Spring 2027.

Total gift = $50k

For Recommendation	**Public**	**Open Session**

To:	**Graduate & Research Council**
Sponsor:	Jeff Casello, Associate Vice-President, Graduate Studies & Postdoctoral Affairs (GSPA)
Contact Information:	jcasello@uwaterloo.ca
Presenter:	Marianne Simm, Director GSPA
Contact Info:	msimm@uwaterloo.ca
Date of Meeting:	**February 13, 2023**

Item Identification:

Introduction of Class Components definitions for the Graduate Studies Academic Calendar.

Summary:

This document provides proposed definitions for class components that were developed by the Registrar's Office with members of the Keep Learning Team and led by the Associate Registrar to improve clarity for instructors and students when scheduling and selecting courses each term. Graduate Studies application of these definitions has been confirmed as appropriate.

Recommendation/Motion:

That council recommend to Senate the approval and adoption of new definitions for the Graduate Studies Academic Calendar, in alignment with the same additions/revisions to the Undergraduate Academic Calendar. The University should adopt the class components definitions included in this document.

Jurisdictional Information:

This item is being submitted to Senate Graduate and Research Council in accordance with Senate Bylaw 2; section 4.03(a).

Governance Path:

1. Graduate Operations Committee review date (mm/dd/yy): 10/18/22
2. Coordination with Associate Registrar to align submission to SGRC with SUC submission and review.

Previous Action Taken:

None

Highlights:

Introduction of definitions for class components in the Graduate Studies Academic Calendar, as presented in detail (Appendix A).

Note, the definitions will be added to the “Glossary of Terms” section of the Graduate Studies Academic Calendar (https://uwaterloo.ca/graduate-studies-academic-calendar/general-information-and-regulations/glossary-terms).

Next Steps:

Effective date: Sept 1, 2023
To be included in the Fall 2023 Graduate Studies Academic Calendar.

(a) Added to the Graduate Studies Academic Calendar Glossy of Terms (https://uwaterloo.ca/graduate-studies-academic-calendar/general-information-and-regulations/glossary-terms), and,
(b) Revisions to the Quest Glossy of Terms – Graduate Section (https://uwaterloo.ca/quest/graduate-students/glossary-of-terms)

Documentation Provided:

Appendix A – Class Components Definitions

APPENDIX A
SENATE GRADUATE AND RESEARCH COUNCIL
February 2023

Class Components Definitions

The two main purposes of course components are: 1) to enable instructors to identify which scheduling option(s) to pick based on what they are planning to do in their courses, and 2) to help students understand what each course entails when registering for their courses.

The table below shows the original current description for each component and the proposed new text to be added to the Graduate Studies Academic Calendar (GSAC) Glossary of Terms, and updated on the Quest Glossary of Terms – Graduate Section.

Current definition (in the glossary of terms on the Quest site), note, definitions currently not included in the GSAC.	**Proposed definition (to be added to the glossary of terms in the GSAC and updated on the Quest site).**
Clinic (CLN): ~~This is a primary meet where~~ teaching is devoted to the analysis ~~and~~ treatment ~~of cases in various special fields normally in a specially equipped clinic setting. There may be a high student/instructor ratio. The frequency of meetings can be as many as 5 per week for a total contact time of 45 hours.~~	**Clinic (CLN)**: Teaching is devoted to the analysis, treatment and management of direct care for clinical cases. Students operate in various specialty fields typically in a clinical setting.
Discussion (DIS): Teaching is based primarily on engaging the students in instructor-guided group discussions. ~~The student/instructor ratio is similar to a seminar. The course is usually held in a smaller teaching or seminar room to facilitate more group involvement. Usually there is 1 meeting per week for a total contact time of 1 to 3 hours.~~	**Discussion (DIS)**: Teaching is based primarily on engaging the students in instructor-guided group discussions.
Ensemble (ENS): ~~This is a primary meet where instruction~~ is conducted by means of evaluating musical performance amongst a group of supporting players. ~~Usually these meets are held in a specially equipped room with 1 to 2 meetings per week for a total contact time of 3 to 4 hours.~~	**Ensemble (ENS)**: Teaching is conducted by means of evaluating musical performance amongst a group of supporting players.
Essay (ESS): ~~This is a primary meet where~~ evaluation is normally based on a formal written piece of work that contains a thesis, substantiated by an argument that is properly referenced. Students work independently in consultation with an instructor. ~~Contact is usually 3 hours per week.~~	**Essay (ESS)**: Evaluation is normally based on a formal written piece of work that contains a thesis, substantiated by an argument that is properly referenced. Students work independently in consultation with an instructor.

Field studies (FLD): ~~This is a primary meet where~~ teaching is conducted outside the classroom. Work is with the primary materials in their original setting. ~~Meetings are usually 1 to 3 per week for a total contact time of 1 to 3 hours.~~	**Field studies (FLD)**: Teaching is conducted outside the classroom. Work is with the primary materials in their original setting.
N/A	**Flight (FLT)**: The flight component is held off campus at the Region of Waterloo International Airport, and is the practical application of flight material learned in the course.
Lab (LAB): Teaching takes place in a room containing special purpose equipment required for student observation, participation, experimentation, or practice. ~~Usually, but not always, a LAB is attached to a regular Lecture, and frequently the instructors for both lecture and lab are the same. There may be a high student/instructor ratio. Normally there are 1 to 3 meetings per week for a total contact time of 1 to 3 hours.~~	**Lab (LAB)**: Teaching takes place in a room containing special purpose equipment required for student observation, participation, experimentation, or practice.
Lecture (LEC): Teaching ~~normally takes place in a classroom setting. Instruction is usually in the form of a series of lectures that meet 1 to 4 times per week for a total contact time of 2 to 4 hours. Typically, there is a large student/instructor ratio.~~ The total class size should be normally more than three students; therefore, when a lecture section is combined with another lecture section (undergraduate or graduate), enrolment may be limited to less than three students in either one of the class sections.	**Lecture (LEC)**: Teaching is usually in the form of a series of lectures. The total class size should be normally more than three students; therefore, when a lecture section is combined with another lecture section (undergraduate or graduate), enrolment may be limited to less than three students in either one of the class sections.
N/A	**Online activities (OLN)**: Teaching and learning occur online for a fully online course or as part of a blended course. This component indicates that a range of instructional approaches are used online such as lectures, readings, discussions, and assessments. For blended courses, usually there are weekly online activities that help students prepare for or otherwise complement the in-person learning component of the course.
Oral conversation (ORL): Teaching is based primarily on engaging the students in instructor-guided group discussions and verbal interaction, usually in a language other than English. ~~The student/instructor ratio is similar to a seminar. The course is usually~~	**Oral conversation (ORL)**: Teaching is based primarily on engaging the students in instructor-guided group discussions and verbal interaction, usually in a language other than English.

~~held in a smaller teaching or seminar room to facilitate more group involvement. Usually there is 1 meeting per week for a total contact time of 1 hour.~~	
Practicum (PRA): Supervised placement time in a work setting exercising practical routines and techniques related to a particular academic ~~plan~~.	**Practicum (PRA)**: Teaching involves supervised placement time in a work setting exercising practical routines and techniques related to a particular academic program. Research and analytical skills are demonstrated based on the practical application of material learned as part of the academic program. Usually, a formal report summarizing the skills learned is required. Facility requirements will vary by discipline. In some disciplines the course may need a specially equipped room and may meet off campus. For graduate courses: to meet criteria for a PRA component, there must be an identified external partner that students engage with; courses identified with PRA must always offer a practicum experience, even if delivered with other course components.
N/A	**Project (PRJ)**: Similar to the reading component, learning usually takes place as a result of independent study/research. However, in this case it makes use of special purpose equipment for student observation, participation, experimentation, or practice.
Reading (RDG): ~~Unlike lecture, seminar, and discussion,~~ learning takes place as a result of student independent study under the supervision of an instructor. ~~Normally there is a one to one student/instructor ratio, although, there may be several students studying the same topic with the same instructor. Typically, there is no defined time/room booking and usually the student(s) meet with the instructor on an informal basis.~~	**Reading (RDG)**: Learning takes place as a result of student independent study under the supervision of an instructor.
Seminar (SEM): Teaching ~~normally takes place in a less formal teaching atmosphere than a lecture. There is typically a smaller student/instructor ratio than with a lecture. The course is usually held in a smaller teaching or seminar room to facilitate more group interaction than occurs in a lecture course. Usually there is 1 meeting per week for a total contact time of 1 to 3 hours.~~	**Seminar (SEM)**: Teaching involves students collectively exploring a topic, or field of study. May be led all or in part by the students.

Studio (STU): ~~This is a primary meet where~~ teaching consists of instructor coaching focused on practical skills execution, normally in a room with special purpose equipment, such as, audio visual recording equipment, theatre technical equipment, etc. ~~There are strict limit capacities on enrolment. Meetings are at least 2 times per week for a total contact time of 4 or more hours.~~	**Studio (STU)**: Teaching consists of instructor coaching focused on practical skills execution, normally in a room with special purpose equipment, such as audio-visual recording equipment, theatre technical equipment, etc.
Test slot (TST): Used only to designate a time slot for holding mid-term exams. ~~Tests are conducted in lecture-type seating equipped with tables and chairs. Tests for a course are usually held once or twice per term for a period of 2 to 3 hours each time.~~ A specific calendar date for each test slot must be included with each TST component section.	**Test slot (TST)**: Used only to designate a time slot for holding mid-term exams. A specific calendar date for each test slot must be included with each TST component section.
~~**Test slot - lecture (TLC):** This component is used in situations where the course has multiple lecture sections and reserve caps and the department does not care how many reserved students go into each section, but they want an overall number of reserved students in the entire course. This means that the course is setup with one TLC primary component and LEC is the secondary component.~~	**N/A**
Tutorial (TUT): ~~Often optional, a Tutorial is a meeting designed to provide the~~ student with additional information ~~and~~ assistance ~~with~~ the course material~~ that is presented in the Primary Meet~~. The format is typically in the form of an open discussion or problem solving session. ~~There may be a high student/instructor ratio. Lecture or Seminar type seating may be utilized. Usually there is 1 meeting per week for a total contact time of 1 to 3 hours.~~	**Tutorial (TUT)**: Teaching provides students with additional information, assistance, and practice applying the course material. The format is typically in the form of an open discussion or problem-solving session.
N/A	**Work term (WRK)**: This component is only used on a co-operative education course to represent an official work-term placement.
Workshop (WSP): ~~This is a primary meet where~~ teaching includes intensive instructor/student contact as well as independent project work. It may be held in a theatre, studio, or a specially equipped room. ~~Projects may include such topics as audio-visual recording, theatrical scenic painting, puppet construction, costume construction.~~	**Workshop (WSP)**: Teaching includes intensive instructor/student contact as well as independent project work. It may be held in a theatre, studio, or a specially equipped room like a flexible or active learning classroom to support groupwork.

~~There are strict limit capacities on enrolment. The duration of a workshop is 4 hours or more at least twice per week.~~	

For Recommendation	**Public**	**Open Session**

To:	**Graduate & Research Council**
Sponsor:	Jeff Casello, Associate Vice-President, Graduate Studies & Postdoctoral Affairs (GSPA)
Contact Information:	jcasello@uwaterloo.ca
Presenter:	Marianne Simm, Director GSPA
Contact Info:	msimm@uwaterloo.ca
Date of Meeting:	**February 13, 2023**

Item Identification:

Introduction of Class Delivery Mode definitions for the Graduate Studies Academic Calendar

Summary:

This document provides proposed definitions for class delivery modes that were developed by the Registrar's Office through the members of Keep Learning Team and led by the Associate Registrar to improve clarity for instructors and students when scheduling and selecting courses each term. The increased interest in and adoption of blended learning courses has amplified the importance of this project at this time. Graduate Studies application of these definitions has been confirmed as appropriate.

Recommendation/Motion:

That council recommend to Senate the approval and adoption of new definitions for the Graduate Studies Academic Calendar, in alignment with the same additions to the Undergraduate Academic Calendar. The University should adopt the delivery mode definitions for In-Person, Blended, and Online in this document.

Jurisdictional Information:

This item is being submitted to Senate Graduate and Research Council in accordance with Senate Bylaw 2; section 4.03(a).

Governance Path:

1. Graduate Operations Committee review date (mm/dd/yy): 10/18/22.
2. Coordination with Associate Registrar to align submission to SGRC with SUC submission and review.

Previous Action Taken:

None

Highlights:

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

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

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

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

Next Steps:

Effective date: Sept 1, 2023
To be added in the Fall 2023 Graduate Studies Academic Calendar.

Added to:

(a) Graduate Studies Academic Calendar Glossary of Terms (https://uwaterloo.ca/graduate-studies-academic-calendar/general-information-and-regulations/glossary-terms), and,
(b) Quest Glossary of Terms – Graduate Section (https://uwaterloo.ca/quest/graduate-students/glossary-of-terms)

Documentation Provided:

Appendix A – Class Delivery Modes

APPENDIX A
SENATE GRADUATE AND RESEARCH COUNCIL
February 2023

Class Delivery Modes

Overview

This document provides proposed definitions for class delivery modes that were developed by the Registrar's Office through the members of Keep Learning Team and led by the Associate Registrar to improve clarity for instructors and students when scheduling and selecting courses each term. The increased interest in and adoption of blended learning courses has amplified the importance of this project at this time. Graduate Studies application of these definitions has been confirmed as appropriate.

Recommendation

Adoption of new and revised definitions for the Graduate Studies Academic Calendar (GSAC).

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

Class Delivery Mode Definitions

The following definitions and guide were developed to help instructors understand the delivery modes available at the University of Waterloo and decide which scheduling option(s) to select based on their goals. The definitions also provide students with information that can assist them when making course selections.

Definitions for Modes

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

Additional background information on definitions

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

CLASS DELIVERY MODES	DEFINITION	NOTES/EXAMPLES	SCHEDULING TERMS ASSOCIATED WITH EACH DELIVERY MODE		
			THE "CAMPUS" CODES INDICATE WHICH INSTITUTION OFFERS THE COURSE	THE "LOCATION" OF WHERE A COURSE IS TAUGHT IS ALSO IDENTIFIED	EXAMPLES
IN-PERSON	A class with scheduled activity primarily occurring in person	Scheduled meet only on campus/in-person	**UW:** University of Waterloo (Main) **CGC:** Conrad Grebel University College **REN:** Renison University College **STJ:** St. Jerome's University **UTD:** United College **WLU:** Wilfrid Laurier University	**U:** Main campus **G:** Conrad Grebel University College **J:** St. Jerome's University **UTD:** United College **R:** Renison University College **L:** Wilfrid Laurier University **STRATFORD:** Stratford campus **KITCHENER:** Kitchener campus	**UW U** = Taught by the University of Waterloo at the University of Waterloo's Main Campus **UW STRATFORD =** Taught by the University of Waterloo at the University of Waterloo's Stratford Campus

				CAMBRIDGE: Cambridge campus	
BLENDED	A class in which student work is distributed between scheduled in-person and required online activities, resulting in fewer scheduled in-class hours	Scheduled on-campus meet + asynchronous online meet/activity (e.g., flipped classroom) Scheduled on-campus meet + synchronous online meet/activity Both types of meets must appear in the schedule of classes, including the online piece whether asynchronous or synchronous To reduce class time, seek approval from department chair	**BLND:** Blended course (Main) **BLNDG:** Blended course (Conrad Grebel University College) **BLNDJ:** Blended course (St. Jerome's University) **BLNDT:** Blended course (United College) **BLNDR:** Blended course (Renison University College)	**U:** Main campus **G:** Conrad Grebel University College **J:** St. Jerome's University **UTD:** United College **R:** Renison University College **L:** Wilfrid Laurier University **STRATFORD:** Stratford campus **+** **ONLINE:** Online course	**BLND U =** Taught by the University of Waterloo; on-campus meet is at the University of Waterloo's Main Campus and includes online element **BLND UTD =** Taught by the University of Waterloo; the on-campus meet is at United College and includes online element
ONLINE	A class scheduled to be fully online that requires no in-person activity (may require in-person exam(s)); may be	Fully online CEL course Instructor-developed online course	**ONLN:** Online course (Main) **ONLNG:** Online course (Conrad	**ONLINE:** Online course	**ONLN ONLINE =** Taught by the University of Waterloo and occurs online

	exclusively asynchronous, synchronous, or a combination of the two.	Fully synchronous course with regularly scheduled meets via web conferencing Asynchronous course with some scheduled meets (seminars, tutorials, office hours) Synchronous course with online asynchronous discussion or other activities	Grebel University College) **ONLNJ:** Online course (St. Jerome's University) **ONLNT:** Online course (United College) **ONLNR:** Online course (Renison University College)		**ONLNR ONLINE =** Taught by Renison University College and occurs online

For Recommendation	**Public**	**Open Session**
To:	**Senate Graduate and Research Council**	
Sponsor:	Clarence Woodsma & Leia Minaker School of Planning, Faculty of Environment	
Contact Information:	cwoudsma@uwaterloo.ca lminaker@uwaterloo.ca	
Presenter:	Leia Minaker	
Contact Info:	Phone: 519-888-4567 x45615 lminaker@uwaterloo.ca	
Date of Meeting:	**February 13, 2023**	

Item Identification:

NEW PROGRAM:
Graduate Program Proposal of Master of Future Cities (MFC).

Summary:

The Master of Future Cities (MFC) is interdisciplinary in nature and will be housed in the Faculty of Environment. This course-based program includes nine courses in a mix of online, in-person block and hybrid delivery formats, including required courses in cities, sustainability, future studies, and a capstone course. The program can be completed either full-time (three terms) or part-time (six - eight terms). The program is regular only with no co-op, and no formal internship, although the applied capstone is required. Tuition is consistent with the per-course equivalent cost of this program's closest competitor program, the Master of Urban Innovation at the University of Toronto (Mississauga). Domestic per-course tuition is $1,986 and international per-course tuition is $4,538.

Recommendation/Motion:

To recommend to Senate the approval of a new course-based Master of Future Cities, offered by the Faculty of Environment, effective 1 September 2023, as presented.

Jurisdictional Information:

This item is being submitted to Senate Graduate and Research Council in accordance with Senate Bylaw 2; section 4.03(e).

Governance Path:

The proposal was approved by the Faculty of Environment Approval: March 31, 2022.

Previous Action Taken:

The proposal was prepared by Johanna Wandel, Associate Dean (Strategic Initiatives), Faculty of Environment, Clarence Woudsma, School of Planning and future Director of the Master of Future Cities program, and Jean Andrey, Dean of Environment with contributions from program faculty Helen Kerr, James Nugent, Cameron McCordic, Pierre Filion, Sarah Burch, Marta Berbes, Dawn Parker, Daniel Cockayne, and Nancy Worth. Section 3.1 (Library Resources) was written by Marian Davies (Resource Librarian for the School of Planning).

Highlights:

The proposed Future Cities Master's program is designed to provide early- and mid-career professionals with competency in futures and systems thinking and foresight methods that can be used to better address the significant challenges of today while anticipating and generating innovative and sustainable options for uncertain and increasingly complex futures in the context of cities.

The University of Waterloo's Strategic Plan, *Connecting Imagination with Impact*, boldly declares "Waterloo is built for change" and that its 2020-2025 plan is for an era of rapid change. The proposed Future Cities program maps strongly onto the first theme of the strategic plan: "developing talent for a complex future".

- Under this theme, students learn to apply knowledge in contexts that we cannot even imagine today. The proposed program embeds foresight methods through systems and futures thinking throughout the program, and engages learners with alternative visions of future cities built from multiple perspectives. The program requires students to develop and demonstrate mastery of futures thinking and applications through a team-based capstone project course.

- University of Waterloo's strategic plan also calls for more interdisciplinarity and flexibility in graduate programs. The proposed program draws on disciplinary and inter-disciplinary knowledge and instructor expertise from the following fields: urban planning, geography, architecture, foresight, sustainability and systems science. Course sequencing within the program ensures that both full time and part-time students will be part of a cohort (all students complete required core courses FCIT 600 and FCIT 601 in the first five months of the program, and the part-time sequence recommends students complete most core courses in the same term as full time students) but also will have options in selecting elective courses. Further the program is designed such that it can be finished in one, two or three years; and it can be completed mostly online (with only two mandatory blocks on campus) but also can include more in-person instruction, if desired by students.

- The University's strategic plan also recognizes that accelerating climate change will magnify existing societal issues, with marginalized communities being among the most affected. The proposed program includes curriculum on climate transitions, climate resilience and climate justice; and several courses explicitly adopt an equity lens.

- The University of Waterloo strategic research plan focuses on eight themes. The proposed program is aligned with and draws on expertise from the theme, "supporting change: society, culture, and governance". More specifically, the program embeds curriculum related to complex systems and strategic decision-making techniques, advancing the understanding of urban systems through the lenses of governance, equity, sustainability, and resilience and an appreciation for how city building and visioning contribute to societal well-being. The program also draws on institutional strengths related to the digital revolution (e.g., smart cities, digital media, autonomous vehicles, AI) and environment and energy (e.g., climate resilience, energy futures).

Program length

The program requires completion of nine (0.5 unit weight) courses (five required, four electives from a prescribed list). Courses will be offered in all three of the University of Waterloo's academic terms. Enrolment may be full-time (three courses/term) or part-time (one or two courses/term). It is expected that courses will be offered as follows:

Required:

FCIT 600 Cities, Systems, Synergy and Collaboration
FCIT 601 Tools for Futures Thinking
FCIT 602 Future Thinking and Cities
FCIT 603 Sustainable Future Cities
FCIT 620 Future Cities Capstone

Recommended:

FCIT 610 International Field School (for students unwilling or unable to participate, any other FCIT elective or open elective from online offerings in the Faculty of Environment may be substituted)

Methods, one of:

FCIT 607 Data, Methods, and Models for Future Cities
INDEV 607 Methods for Sustainable Development Practice: A Systems Approach

Electives, two of:

FCIT 604 The Socially Just City
FCIT 605 The Future of Work
FCIT 606 Sustainability Transitions in Cities
ARCH 6XX Critical Engagements with Urban Technology (note: course has been taught as ARCH 684, Special Topics in Architecture, but will be assigned a permanent dedicated course code.)
PLAN 684 Physical Infrastructure and Planning
FCIT 609 Mobility Futures
PLAN 606 Modeling the City

It will be possible to complete all degree requirements in three terms; however, it is expected, given the mid-career professional focus, that the majority of candidates will complete one or two courses at a time, and thus complete the program in six to eight terms.

It is hoped that the program can start in Fall 2023. Enough courses will be in place such that both part-time and full-time students entering in the first cohort can complete the program. Enrolment in Year 1 is targeted at 12 new students (7 part-time and 5 full-time), increasing to an annual intake of 25-35 students (~70% part-time and 30% full-time), once steady-state is achieved in the 7th year of the program (class entering in 2029); 90% of enrolment is expected to be domestic.

Next Steps:

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

Documentation Provided:

Volume I – New Program Proposal

Graduate Studies Course and Calendar Forms

Volume II – Faculty Curricula Vitae

External Reviewers Report

Program and Dean Responses to External Reviewers' Report

UNIVERSITY OF
WATERLOO

NEW GRADUATE PROGRAM PROPOSAL

OF

MASTER OF FUTURE CITIES (MFC)

Submitted to the
Ontario Universities Council on Quality Assurance

VOLUME I - PROPOSED BRIEF

DECEMBER 2022

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Brief Listing of the Program

The Master of Future Cities (MFC) is interdisciplinary in nature and will be housed in the Faculty of Environment. This course-based program includes nine courses in a mix of online, in-person block and hybrid delivery formats, including required courses in cities, sustainability, future studies, and a capstone course. The program can be completed either full-time (three terms) or part-time (six - eight terms). The program is regular only with no co-op, and no formal internship, although the applied capstone is required. Tuition is consistent with the per-course equivalent cost of this program's closest competitor program, the Master of Urban Innovation at the University of Toronto (Mississauga). Domestic per-course tuition is $1,986 and international per-course tuition is $4,538.

1.2 Method Used for Preparation of the Brief

This brief was prepared by Johanna Wandel, Associate Dean (Strategic Initiatives), Faculty of Environment, Clarence Woudsma, School of Planning and future Director of the Master of Future Cities program, and Jean Andrey, Dean of Environment with contributions from program faculty Helen Kerr, James Nugent, Cameron McCordic, Pierre Filion, Sarah Burch, Marta Berbes, Dawn Parker, Daniel Cockayne, and Nancy Worth. Section 3.1 (Library Resources) was written by Marian Davies (Resource Librarian for the School of Planning).

Date of Faculty of Environment Approval: March 31, 2022.

1.3 Objectives of the Program (QAF 2.1.1)

The 21st Century is the century of the city, with the United Nations estimating 75% of the global population will live in cities by 2050. The classic wicked problems that we associate with city building and urban life are epitomized in the critical need to address the climate crisis while at the same time tackling societal crises related to equity and justice across our communities. Concurrently, we are in the midst of an unprecedented digital revolution which is disrupting our world faster and across more domains than ever before, driving systems level changes in our economies, societies and governance.

The traditional approaches to studying, planning, managing, and visioning our cities are arguably struggling to address our challenges today and lack the capacity to critically explore and develop alternatives for a future city. There is need to move beyond the silos within cities and disciplinary boundaries to foster multidisciplinary and transdisciplinary thinking applied to urban challenges and futures.

The proposed Future Cities Master's program is designed to provide early- and mid-career professionals with competency in futures and systems thinking and foresight methods that can be used to better address the significant challenges of today while anticipating and generating innovative and sustainable options for uncertain and increasingly complex futures in the context of cities.

The University of Waterloo's Strategic Plan, *Connecting Imagination with Impact*, boldly declares "Waterloo is built for change" and that its 2020-2025 plan is for an era of rapid change. The proposed Future Cities program maps strongly onto the first theme of the strategic plan: "developing talent for a complex future".

- Under this theme, students learn to apply knowledge in contexts that we cannot even imagine today. The proposed program embeds foresight methods through systems and futures thinking throughout the program, and engages learners with alternative visions of future cities built from multiple perspectives. The program requires students to develop and demonstrate mastery of futures thinking and applications through a team-based capstone project course.
- University of Waterloo's strategic plan also calls for more interdisciplinarity and flexibility in graduate programs. The proposed program draws on disciplinary and inter-disciplinary knowledge and instructor expertise from the following fields: urban planning, geography, architecture, foresight, sustainability and systems science. Course sequencing within the program ensures that both full time and part-time students will be part of a cohort (all students complete required core courses FCIT 600 and FCIT 601 in the first five months of the program, and the part-time sequence recommends students complete most core courses in the same term as full time students) but also will have options in selecting elective courses. Further the program is designed such that it can be finished in one, two or three years; and it can be completed mostly online (with only two mandatory blocks on campus) but also can include more in-person instruction, if desired by students.
- The University's strategic plan also recognizes that accelerating climate change will magnify existing societal issues, with marginalized communities being among the most affected. The proposed program includes curriculum on climate transitions, climate resilience and climate justice; and several courses explicitly adopt an equity lens.
- The University of Waterloo strategic research plan focuses on eight themes. The proposed program is aligned with and draws on expertise from the theme, "supporting change: society, culture, and governance". More specifically, the program embeds curriculum related to complex systems and strategic decision-making techniques, advancing the understanding of urban systems through the lenses of governance, equity, sustainability, and resilience and an appreciation for how city building and visioning contribute to societal well-being. The program also draws on institutional strengths related to the digital revolution (e.g., smart cities,

digital media, autonomous vehicles, AI)) and environment and energy (e.g., climate resilience, energy futures).

The Master of Future Cities will address the University of Waterloo's Graduate Degree Level Expectations (GDLEs) as follows:

Table 1: Graduate Degree Level Expectations, Master of Future Cities

GDLE 1: Depth and Breadth of Knowledge.
Learning Objective 1: **Interdisciplinary knowledge of the concepts, information, and techniques relevant to futures studies, sustainability, and cities** • Develop a futures thinking lens incorporating systems thinking and sustainability • Understand and apply strategic decision-making methods that emphasize uncertainty and incorporate futures studies • Explain and examine city systems and their major challenges • Explain and apply sustainability, systems thinking and futures studies in the context of city challenges and urban futures
GDLE 2: Research and Scholarship
Learning Objective 2: **Demonstrate a conceptual understanding and methodological competence that enables the critical interpretation of current research findings and the application of research techniques specific to futures studies, sustainability, and cities** • Describe and consider the tools and methods used to collectively envision, imagine, and respond to urban futures • Analyze and interrogate current research on futures studies, sustainability, and selected city challenges • Explain, assess, and generate futures responses to complex city challenges
GDLE 3: Level and Application of Knowledge
Learning Objective 3: **Demonstrate competence in the application of an existing body of knowledge through research and critical analysis that addresses future cities challenges** • Explain, utilize, and critique data relevant to current and future city challenges • Design and conduct research applying futures, systems, and sustainability to real-world complex city challenges • Collaboratively develop pro-active interdisciplinary solutions to future city challenges

GDLE 4: Professional Capacity/Autonomy
Learning Objective 4: **Demonstrate professional capacity and autonomy, through ethical behavior consistent with academic integrity and research guidelines, personal initiative, responsibility, and sound decision-making in diverse academic and professional situations.** • Demonstrate professionalism through personal initiative and responsibility in all aspects of the classroom, laboratory, team projects, field school, and capstone work. • Demonstrate the ability to work effectively in interdisciplinary teams on problems relating to urban futures • Take a proactive and self-reflective approach to develop professional networks and relationships inside and outside the program.
GDLE 5: Level of Communications Skills
Learning Outcome 5**: Demonstrate effective communication of ideas, results and conclusions in visual, oral and written forms.** • Demonstrate competency to effectively communicate complex problems including technical challenges, social, environmental, sustainability, justice, equity and economic issues, in a variety of contexts and to diverse expert and non-expert audiences. • Be able to produce a range of written communication products for varied audiences. • Apply techniques to improve confidence and effectiveness in professional speaking and presentation skills in all communications within the program.
GDLE 6: Awareness of Limits of Knowledge
Learning Outcome 6: **Be cognizant of the complexity, uncertainty and limitations of knowledge related to futures studies, sustainability, and cities** • Have appreciation for the inherent complexities of cities, the uncertainties in applying futures studies, and the limits of program knowledge domains. • Develop an openness to alternative thinking, values, viewpoints and systems across the subject domains of the MFC

1.4 Admission Requirements (QAF 2.1.2)

- A four-year Honours Bachelor degree (or equivalent) in any humanities, social science, health, business, engineering or science discipline with an overall average of at least 75% in the last 20 courses (or last two years).
- Applicants whose first language is not English must demonstrate command of the English language with a minimum internet-based TOEFL score of 100 (writing 26; speaking 26) or the equivalent on a comparable test such as IELTS 7.5 (writing 7.0; speaking 7.0).
- Applications require two letters of reference (either professional or academic), a resume/CV, a personal statement, and transcripts of all previous attempted or completed university programs.

1.5 Structure (QAF 2.1.3)

1.5.1 Program Structure

The program requires completion of nine (0.5 unit weight) courses (five required, four electives from a prescribed list). Courses will be offered in all three of the University of Waterloo's academic terms. Enrolment may be full-time (three courses/term) or part-time (one or two courses/term). It is expected that courses will be offered as follows:

Required:
FCIT 600 Cities, Systems, Synergy and Collaboration
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Recommended:
FCIT 610 International Field School (for students unwilling or unable to participate, any other FCIT elective or open elective from online offerings in the Faculty of Environment may be substituted)

Methods, one of:
FCIT 607 Data, Methods, and Models for Future Cities
INDEV 607 Methods for Sustainable Development Practice: A Systems Approach

Electives, two of:
FCIT 604 The Socially Just City
FCIT 605 The Future of Work
FCIT 606 Sustainability Transitions in Cities
ARCH 6XX Critical Engagements with Urban Technology (note: course has been taught as ARCH 684, Special Topics in Architecture, but will be assigned a permanent dedicated course code.)
PLAN 684 Physical Infrastructure and Planning
FCIT 609 Mobility Futures
PLAN 606 Modeling the City

1.5.2 Program length

It will be possible to complete all degree requirements in three terms; however, it is expected, given the mid-career professional focus, that the majority of candidates will complete one or two courses at a time, and thus complete the program in six to eight terms.

Candidates can only begin the Master of Future Cities in Fall terms. Typical three, six and eight term sequences are as follows:

Table 2: Typical course sequences

Courses in bold are required
Students choose two of courses marked with an asterisk (*)

Over three terms

	Spring	Fall	Winter
1		**FCIT 600[1]** **FCIT 601** **FCIT 602** Option to take a 4th course: FCIT 605* or FCIT 609* instead of one of the restricted electives in Winter or Spring	FCIT 607 or INDEV 607 **FCIT 603** CIVE 684* or FCIT 606* or ARCH 6XX* or PLAN 606*
2	FCIT 610 or open elective **FCIT 620** FCIT 604*		

Over six terms

	Spring	Fall	Winter
1		**FCIT 600[1]** **FCIT 601** **FCIT 602**	FCIT 607 or INDEV 607 **FCIT 603**
2	FCIT 610 or open elective FCIT 604*	FCIT 605* FCIT 609*	CIVE 684* FCIT 606* ARCH 6XX* PLAN 606*
3	**FCIT 620**		

Over eight terms

	Spring	Fall	Winter
1		**FCIT 600[1]** **FCIT 601**	FCIT 607 or INDEV 607
2	FCIT 610 or FCIT 604* or open elective	**FCIT 602**	**FCIT 603**
3	**FCIT 620**	FCIT 605* or FCIT 609*	FCIT 606* or CIVE 684* or ARCH 6XX or PLAN 606*

[1]FCIT 600 will require registration as a Fall term course, but will be delivered as a block in-person on-campus course before the beginning of the Fall term lecture period. During this time, space is available in Campus Housing, though students are welcome to make their own arrangements in Waterloo.

1.6 Program Content (QAF 2.1.4)

As the challenges of the climate crisis intensify alongside disruptions in all domains, cities are increasingly required to anticipate uncertain social and environmental conditions, to build resilience, and to integrate sustainable development goals into the policies, programs, and frameworks that will shape their future. The proposed curriculum is uniquely composed of a knowledge foundation in cities, future studies and sustainability complemented by a focused subject matter investigation (future of work, just cities, future mobilities) and skill development (foresight methods, systemic frameworks, data analytics). Collectively, the knowledge foundation and subject focus will be integrated through innovation application in the capstone project course.

The MFC consists of nine courses, only one of which can be chosen from beyond the list presented in Section 1.5.1. If the recommended International Field School (FCIT 610) is completed, all nine courses will be drawn from this list. All courses credited toward the degree, including the optional open elective, will be at the graduate level.

The required courses are structured to encourage cohort interaction to foster professional networking and collegial development of futures literacy in the urban realm over the longer term. Incoming cohorts will complete an intense, in-person block course (FCIT 600) and interact both virtually and in-person in FCIT 601 to build collaboration competency. FCIT 600 is planned as an intensive on-campus in person course spanning seven instructional days (plus a weekend for further cohort-building activities) in late August/early September. Once the program is in steady state, further networking will be encouraged via the final capstone presentations from FCIT 620 to be delivered to FCIT 600 students, either in person or virtually.

The balance of the required courses provide historical context of why and how the future is and has been considered in urban studies and urban planning (FCIT 602), the importance of sustainability for urban futures (FCIT 603). Additionally, students engage with one of two methods courses focused on big data (FCIT 607) or systems analysis (INDEV 607).

All students are strongly encouraged to complete the International Field School (FCIT 610) in the fourth term, further reinforcing the cohort feel. Through this course, students will be exposed first-hand to examples of emergent solutions to complex challenges internationally. Destination cities will change from year to year, with Singapore or Amsterdam as likely locations in the initial years. FCIT 610 is strongly recommended but not required because of both cost and potential travel restriction related issues.

Electives are framed within some of the greatest expected future challenges for urban systems, including transport (FCIT 609), infrastructure (PLAN 684), labour (FCIT 605), social justice (FCIT 604), urban technology (ARCH 6XX) and climate change and sustainability transitions (FCIT 606). One elective (PLAN 606) allows the development of modeling competence if students wish to pursue more quantitative tools.

Students who elect to complete the program in either six or eight terms will retain the same cohort for the applied capstone course (FCIT 620). As already noted, students will present their applied capstone projects to the new, incoming cohort completing FCIT 600, thus allowing cross-cohort interaction.

1.7 Mode of Delivery (QAF 2.1.5)

The program will be delivered via a mix of in-person block courses, remote courses with concentrated in-person elements at the end of the term, fully online (developed asynchronously in collaboration with CEL, the University's Center for Extended Learning) and remote courses (delivered synchronously online). Approximately 75%-85% of all course content and interaction will be online, 15% in-person on campus and 10-15% in person off-site (depending on optional participation in the field course, locations will vary). Specifically, the courses will be delivered as follows:

Table 3 Courses by term of offer and mode

Course	Term of offer	Mode
Required		
FCIT 600	Fall	In-person block, August-September
FCIT 601	Fall	Hybrid; remote teaching during lecture period, with in-person element in December.
FCIT 602	Fall	Online (CEL developed)
FCIT 603	Winter	Online (CEL developed)
FCIT 620	Spring	Hybrid; remote capstone work with in-person or remote presentations in August.
Recommended		
FCIT 610	Spring	In person block at international location (varies from offer to offer)
Methods (choose 1)		
FCIT 607	Winter	Remote
INDEV 607	Winter	TBD, likely in-person and remote offerings
Electives (choose 2)		
FCIT 604	Spring	Online (CEL developed)
FCIT 605	Fall	Remote
FCIT 606	Winter	Online (CEL developed)
ARCH 6XX	Winter	Remote
PLAN 684	Winter	Hybrid; both remote and in-person participation possible
PLAN 606	Winter	In person
FCIT 609	Fall	TBD, remote or online.

For students opting to complete an open elective, the Faculty of Environment offers multiple CEL-developed online courses focused on various Planning, Sustainability and Climate Change topics every term. Participation in in-person offerings is also possible during Fall and Winter terms.

1.8 Assessment of Teaching and Learning (QAF 2.1.6)

The program and its courses have been designed to meet Masters Graduate Degree Level Expectations (GDLEs) to ensure a) that these courses deliver content appropriate to post-undergraduate training; and b) that some of these courses can be used as electives in related programs to ensure sustainability of resourcing of the degree.

Each course has its own specific learning outcomes, consistent with the learning outcomes listed in Table 1. Each course will use unique evaluation tools, but in all cases, assessment of learning and feedback will be more frequent than in traditional face-to-face courses given the high share of courses delivered remotely/online. The elective courses will all include the preparation of an independent, professional report or paper plus multiple smaller assignments and quizzes. Specific evaluation tools are at the discretion of the instructor; however, evaluation in all courses will be examined by the Curriculum Committee. Table A1 in Appendix A outlines detailed assessment methods for each of the core courses listed in Section 1.5.1.

Learners will be assessed on skill and knowledge development through individual and collaborative group projects focused on subject matter specialization as outlined in curriculum. Students must maintain a minimum 75% cumulative GPA over the course of the program and in order to graduate.

Capstone projects may include external sponsors who will assess competency, effort, and alignment of skills to given challenges. In many cases, students will already be working in sectors such as urban planning, urban infrastructure or sustainability management, and the program builds skills in explicit, structured consideration of possible and plausible futures to enhance existing careers. Alumni will be highly qualified to launch careers related to their studies as policy makers in the public sector, strategic innovators in the private sector, and as social advocates in the nonprofit sector. Students may also be encouraged to participate in international competitions such as the Association of Professional Futurists Student Awards or the extra-curricular Positive Futures Cities competition. Student capstone projects may be presented at conferences and symposia such as the RSD (Relating Systems Thinking and Design) annual international symposium (https://rsdsymposium.org) or the Future Cities Canada Summit.

Overall program success will be assessed via an exit and 5-year post-graduation survey conducted by the Senior Alumni Advancement Officer, Faculty of Environment. The survey will focus on the extent to which graduates feel the program's learning objectives have been accomplished (exit survey) and applied in various employment contexts (5 year survey), the ways in which the degree program provides career opportunities and progression (both surveys) and graduates perception of how the degree training had

substantive impact on cities' programming and policy (5 year survey). Additionally, a closed LinkedIn Group will be established for students and alumni, and the Director will periodically seed advice on program outcomes via this group as well as monitoring graduates' career trajectories. Efforts will be made to maintain links to graduates via invitations to the Faculty of Environment Future Cities lecture series, which had its inaugural session in February 2022.

2. **HUMAN RESOURCES (QAF 2.1.7)Resources for Graduate Programs Only (QAF 2.1.8)**

As highlighted in Table 3 and Volume 2 of this submission, the MFC draws on a number of leading faculty members in the Faculty of Environment, with contribution from the School of Architecture. Contributing faculty are trained in a number of fields including Planning, Geography, Industrial Ecology, Economics and Interdisciplinary Studies. While all of participating faculty members implicitly address urban futures in their own work, they will be complemented by a part-time Lecturer who is also professional futurist, Helen Kerr, and a new, full-time hire, the Caivan Future Cities Professor (see Appendix B for job posting, filled by Marta Berbes as of January 1, 2022.) A second hire, in Smart Cities, is expected to be posted in 2022.

1.10 List of Faculty by Field

The MFC will be offered at the Faculty Level, with contributions from the School of Planning, the Department of Geography and Environmental Management (GEM), the School of Environment, Enterprise and Development (SEED), the Department of Knowledge Integration (KI) and the School of Environment, Resources and Sustainability (SERS). Core courses in Futures and Systems Thinking, Cities and Sustainability will be offered by leading thinkers in those fields (e.g., Vanessa Schweizer, Associate Professor in Knowledge Integration and the current Director of the Waterloo Institute for Complexity and Innovation [WICI] will contribute to FCIT 600; Pierre Filion, Professor Emeritus in the School of Planning is a long-established authority on Canadian and International Cities; Helen Kerr, a newly appointed Lecturer at the Faculty Level, is a practicing futurist who is co-principal of a design firm and has taught Futures Thinking courses at OCADU).

Core courses are supported by a required methods course, taught by experts in their fields. Thematic electives are taught by faculty whose primary appointment is in one of the units of the Faculty of Environment and whose research expertise includes subject matter relevant to urban futures (e.g., Sarah Burch, Associate Professor and Canada Research Chair in Sustainability Governance and Innovation, will teach the course on Sustainability Transitions in Cities [FCIT 606], a core thrust of her research program).

Table 4 Faculty Complement

Faculty Name	Rank (Professor, Assistant, etc.)	Gender (M/F/U)	Home Unit [1]	Supervisory Privileges [2]
Jean Andrey	Professor	F	GEM	Full
Marta Berbes	Assistant Professor	F	Planning/Faculty Level	Masters
Jeff Casello	Professor	M	Planning/CEE	Full
Sarah Burch	Associate Professor	F	GEM	Full
Daniel Cockayne	Associate Professor	M	GEM	Full
Pierre Filion	Professor Emeritus	M	Planning	Full
Helen Kerr	Lecturer	F	Faculty Level (Environment)	Masters
Cameron McCordic	Assistant Professor	M	SEED	Masters
John McLevey	Associate Professor	M	Knowledge Integration	Full
Leia Minaker	Assistant Professor	F	Planning	Masters
Markus Moos	Associate Professor	M	Planning	Full
James Nugent	Continuing Lecturer	M	SERS/Faculty level	Masters
Dawn Parker	Professor	F	Planning	Full
Maya Przybylski	Associate Professor	F	Architecture	Full
Vanessa Schweizer	Associate Professor	F	Knowledge Integration	Full
Simron Singh	Professor	M	SEED	Full
Nancy Worth	Associate Professor	F	GEM	Full

Notes:

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

1.11 Commitment of Faculty from Other Graduate Programs/Other Institutions

With the exception of new hires, all of the faculty who will contribute to the MFC will also contribute to graduate programs in their home units. Future Cities core courses are developed exclusively for Master of Future Cities students. Elective courses will, where appropriate, also contribute to existing graduate programs in the faculty member's home unit (i.e. FCIT 605 will be available to MA and MES students in Geography; FCIT 605 will be available to Master of Climate Change students.)

1.12 Quality of Faculty (QAF 2.1.10)

The MFC will be delivered by an experienced complement of faculty with extensive teaching, research and administrative records. All of the faculty, including new appointment Helen Kerr, have taught well-received courses in their areas of expertise for five or more years. A number of faculty (Jean Andrey, Markus Moos, Daniel Cockayne, James Nugent) have been explicitly recognized via teaching awards.

Although faculty members contributing to this initiative have extensive research and teaching experiences in thematic areas which implicitly address urban futures, future studies is a relatively new field for the University of Waterloo. To this end, the faculty has added two new positions. Helen Kerr, who joined Waterloo as a part-time Lecturer on July 1, 2021, has more than 25 years' experience in applied design and futures work as co-principal of KerrSmith Design. Over the past several years, she has been a sought-after speaker on foresight and urban design. From 2009 to 2020, she taught in OCADU's Strategic Foresight graduate program. Ms. Kerr will anchor the tools and techniques for futures studies components of the curriculum (FCIT 601, with contributions to FCIT 600, FCIT 610 and FCIT 620). She will work with the new Caivan Communities Future Cities Professor, Marta Berbes.

A number of faculty have research programs of direct relevance to future studies and systems thinking. Vanessa Schweizer has published work on climate change assessment scenarios and energy futures, and has an extensive track record in socio-technical scenarios for climate change research. Sarah Burch has worked with communities in British Columbia on responding to visual scenarios of sea level rise management under various climate scenarios. Simron Singh, Vanessa Schweizer, Dawn Parker, Cameron McCordic, and Jeff Casello are experts in systems approaches, with applications to sustainability (Singh, McCordic), climate scenarios (Schweizer), urban infrastructure (Casello) and modelling (Parker).

Program faculty bring a wealth of methodological expertise, ranging from ethnography and qualitative research (Worth, Cockayne) to quantitative and modelling approaches (Casello, Parker) and future studies (Kerr, Berbes).

Both core courses and thematic electives in the MFC will be designed and delivered by experts in their field. Pierre Filion will develop a course focused on the history and context of urban planning's approach to the future city (FCIT 602), based on a long research and teaching career in urban planning and planning theory. Cameron McCordic's FCIT 603 builds on a research and teaching track record focused on sustainable development goals and urban food systems with particular emphasis on the Global South. Nancy Worth and Daniel Cockayne are economic geographers who have done extensive research on labour, particularly changing demographics (Worth) and precarious employment (Cockayne), and will build on this and their undergraduate Labour Geography course to develop FCIT 605. James Nugent's research focuses on justice and equity in urban systems, and he will develop FCIT 604 along with a to-be-identified co-instructor with lived experiences as a member of an equity-seeking group. Sarah Burch is Canada Research Chair in Sustainability Governance and Innovation, and is well-positioned to develop FCIT 606. Jeff Casello already teaches a graduate course on urban infrastructure and Planning, PLAN 684. Maya Przbylbski has already taught ARCH 6XX, Critical Engagements with Urban Infrastructure, as a special topics Architecture course. Jean Andrey's research program includes extensive work on transportation and mobilities, and she will contribute to FCIT 609.

One of the required methods courses already exists, INDEV 607, taught by Simron Singh, prioritizes systems analysis. John McLevey has been teaching graduate-level courses in computational data analysis, and will develop FCIT 607. The two instructors have agreed to work toward parallel methods competencies.

The faculty listed in this program brief bring an extraordinary degree of university administrative experience, ranging from Associate Vice-President, Graduate Studies and Postdoctoral Affairs (Casello) and Dean (Andrey), through Associate Dean (Singh), School Director (Moos, Woudsma), Research Centre Executive Director (Burch, Interdisciplinary Centre on Climate Change to Associate Chair (Schweizer).

The Master of Future Cities will draw on interdisciplinary expertise and approaches, and the program faculty reflect this with degrees in traditional disciplines including geography, planning, economics, engineering, sociology, and public health, as well as interdisciplinary degrees including Engineering and Public Policy, Environmental Studies and Human Ecology.

2. PHYSICAL AND FINANCIAL RESOURCES (QAF 2.1.7)

2.1 Library Resources

3.1.1 Level of support summary

The Library provides a high level of support for the existing programs and courses offered through the Faculty of Environment and anticipates that this high level of support will extend to the proposed Master of Future Cities. Students and faculty members in the proposed program will be encouraged to make use of the learning, teaching and research support services and expertise the Library offers. Current collection strengths would support the new program. No new collections are needed at this time. Should new subject areas emerge or if research intensity develops in subject areas currently outside of collection priorities, the Library is committed to engaging in discussions to articulate collection needs and assess funding implications.

3.1.2 Strengths of support provided and opportunities

Collections

The Library purchases and subscribes to a high number of resources relevant to the areas of focus. Key subscriptions to databases and data set collections include Avery Index to Architectural Periodicals, Building Green Suite, Building Types Online, MCEER, Scopus, TRID: the TRIS and ITRD database, ODESI, and the Social Science Research Network (SSRN). Access to journals, books, news sources, handbooks, and encyclopedias is through Waterloo subscriptions and consortial purchases through partnerships with Canadian universities such as the Ontario Council of University Libraries (OCUL) and the Canadian Research Knowledge Network (CRKN). The liaison librarian encourages purchase recommendations from faculty and students to ensure the collection meets the current research and teaching interests.

Research and instruction support

The liaison librarian is available to advise faculty and students on library resources and services including coursework, theses and major research project work, and publications. Discussions focus on identifying relevant resources and developing research strategies and techniques. The liaison librarian is a part of orientation activities and class sessions (in person and virtually) that introduce students to library resources and services. Customized library research guides and online modules created and maintained by the liaison librarian, facilitate the self-guided navigation and understanding of the Library's system.

Library and department interaction

The liaison librarian periodically surveys faculty to ensure library-related research and teaching needs are being met. Instructional support includes development of online modules and research guides as well as in-class sessions. The liaison librarian also offers in-person and online research consultations to support coursework, research publications, research data management, meeting open access requirements, and copyright. She would welcome further discussions on how the Library can improve users' research skills including emerging ones relating to measuring research impact and managing research data.

2.2 Computer Facilities

All faculty and graduate students are provided with an account on the University computing system. This account provides access to email, internet, and Microsoft Office 365. As students will be primarily working remote and online, no other facilities are needed.

2.3 Space

No new space needs beyond office space for new hires is anticipated. The Faculty of Environment is located in Environment Buildings 1, 2 and 3. Although course delivery will primarily be online/remote, when students are on campus for a block course or an optional in-person course, study space is available in flex office spaces in Environment 1 as well as a graduate lunchroom and extensive common space including the Environment 1 and 3 courtyard spaces and both a student-run and commercial coffee shop in the Environment buildings. Furthermore, during block courses on campus or in person elements at the end of remote courses (e.g., FCIT 602, FCIT 620), which are held outside the normal lecture period, dedicated rooms will be booked in Environment 3 for the duration of the course element.

All current faculty members associated with the program already have dedicated office space.

2.4 Financial Support

The University of Waterloo has a number of awards, bursaries and scholarships that all full-time graduate students can apply for. The level of support will be consistent with other existing coursework based Masters programs within the Faculty of Environment, i.e., students are eligible for scholarship support but have no minimum funding guarantees.

The University has been successful in generating external, philanthropic funds for entrance scholarship for students who will be admitted to the Future Cities Master's

program for the first four years (32 awards, each valued at $5,000, for a total value of $160,000). Considering the emerging salience of urban decision-making under uncertain futures, it is believed that there is strong potential to attract additional scholarship support for the program.

3. CURRICULUM

3.1 The Intellectual Development and the Educational Experience of the Student

3.1.1 Orientation and Opportunities for Cohort Building

Despite the fact that the program will be primarily delivered in an online/remote format, the Master of Future Cities is designed to facilitate strong professional networking and connections within a cohort of students. The first required course, FCIT 600, serves multiple roles: it introduces students to the degree program learning outcomes and objectives; establishes the foundational context for the program related to cities, systems thinking, sustainability, technology, futures studies and collaboration methods; its intensive in-person block format on campus in August ensures that students within each cohort establish a working relationship, and it will temporally overlap with final capstone presentations in FCIT 620, the applied capstone course students complete at or near the end of their degree and thus present opportunities for cross-cohort networking. Orientation activities, designed to establish cohorts and familiarize students with program sequencing, expectations and delivery modes will be built into the delivery of FCIT 600.

3.1.2 Relationship of Curriculum to Graduate Degree Level Expectations

The required course sequence and thematic electives will provide ***the broad interdisciplinary knowledge, information and techniques relevant to futures studies, sustainability, and cities*** (GDLE 1) through the development and application of a future thinking lens (core to FCIT 600, FCIT 601) to understand and apply strategic decision-making methods that emphasize uncertainty and incorporate future studies (FCIT 601, FCIT 620), with a focus on major challenges including sustainability (FCIT 603). Elective offerings will further support this GDLE through focus on explaining and applying sustainability, systems thinking and future studies in the context of city challenges and urban futures related to climate change (FCIT 606), work (FCIT 605), infrastructure (PLAN 684), transportation (FCIT 609) and justice and equity (FCIT 604).

Students will develop and ***demonstrate conceptual understanding and methodological competence that enables the critical interpretation of current research findings and the application of research techniques specific to futures studies, sustainability, and cities (GDLE 2)*** through training in systems thinking (FCIT 600, FCIT 601, INDEV 607) and tools for futures thinking (FCIT 601). Research skills will be further developed through the completion of one of two methods courses focusing on data analytics (FCIT 607) or systems approaches to sustainable development methods (INDEV 607). Methodological competence is reinforced through elective offerings including modelling (PLAN 606). Students will gain experience in analyzing and interrogating current research on future studies, sustainability, and selected city challenges though core and elective courses throughout the program. Research skills to explain, assess and generate future responses are applied to real world situations through the recommended international field school (FCIT 610) and the required applied capstone project (FCIT 620), achieving ***GDLE 3: Demonstrate competence in the application of an existing body of knowledge through research and critical analysis that addresses future cities challenges.*** Competence involves the ability to explain, utilize, and critique data relevant to current and future city challenges (FCIT 607, INDEV 607), and designing and conducting research applying futures, systems and sustainability to real-world complex system challenges (FCIT 610, FCIT 620). Collaboration to develop interdisciplinary solutions is first introduced in FCIT 600, and reinforced throughout, particularly through projects in FCIT 601, FCIT 610, and the applied capstone in FCIT 620.

Master of Future Cities students will, in many cases, already be practicing professionals, though some will enter directly from undergraduate programs. All students will learn to ***demonstrate professional capacity and autonomy, through ethical behaviour consistent with academic integrity and research guidelines, personal initiative, responsibility, and sound decision-making in diverse academic and professional situations (GDLE 4);*** and ***demonstrate effective communication of ideas, results and conclusions in visual, oral and written forms (GDLE 5).*** Continuous professional capacity development is achieved throughout all courses, which will require a mix of independent and interdisciplinary teamwork, online and in-person presentations (see Appendix A).

Master of Future Cities students will frame their work within uncertain urban futures throughout the program from the introductory block course (FCIT 600) to the capstone project (FCIT 620), directly addressing ***GDLE 6: Be cognizant of the complexity, uncertainty and limitations of knowledge related to futures studies, sustainability, and cities.*** While courses address not only ways of interpreting data (FCIT 607) and employ systems thinking (FCIT 600, FCIT 607) to consider future conditions, much of the work that students in this field will do will be within the context of multiple plausible futures. FCIT 601 is focused on tools and techniques for decision-making under uncertain futures.

3.1.3 Other opportunities and experiential learning

The Faculty of Environment is in the process of establishing a Future Cities lecture series, supported in part by an external gift. While lectures will occur on campus during normal working days, MFC students will be encouraged to attend in person (if possible) or via webcast. The program is designed as a primarily remote professional program, and thus it is unlikely that there will be high demand for the services of the Center for Career Action, Centre for Teaching Excellence and other Graduate Studies workshops. These opportunities are, however, available, and Future Cities students are encouraged to participate.

The Master of Future Cities does not have a required internship or co-op experience. Applied learning is, however, built into core courses throughout the program, including via the recommended international field school (FCIT 610) and the applied capstone project (FCIT 620). Furthermore, students will be strongly encouraged to attend conferences, including the Association of Professional Futurists, an international community of professional futurists dedicated to promoting professional excellence and demonstrating the value of futures thinking, annual meeting. The University of Waterloo provides financial support to graduate students to present their work, through its Graduate Studies Conference Assistantship. The Faculty of Environment commits to providing the necessary matching funds associated with this application.

3.2 Program Regulations

The program requires completion of nine (0.5 unit weight) courses (five required, four restricted electives). Candidates must pass all courses (minimum 60%). Additionally, in accordance with Faculty of Environment graduate-level coursework requirements, candidates must obtain a minimum average of 70% across all courses. There are no required progress reports or requirements beyond maintaining the minimum average.

Admission requirements are a four-year Honours Bachelor Degree (or equivalent) in any humanities, social science, business, health, engineering or science discipline with an overall average of at least 75% in the last 20 courses (or last two years), but given the interdisciplinary nature of the field, students are not required to demonstrate competence in any particular subject field as a pre-requisite for admission. Applicants whose first language is not English must demonstrate command of the English language with a minimum internet-based TOEFL score of 100 (writing 26; speaking 26) or the equivalent on a comparable test such as IELTS 7.5 (writing 7.0; speaking 7.0), and two letters of reference (either professional or academic).

3.3 Part-time Studies

The program is primarily envisioned as part-time, though a full-time option exists for those wishing to complete it in an accelerated fashion. Courses will primarily be delivered remotely, with synchronous sessions in required courses (if required). Where in person components are planned, these will run during defined blocks, typically at the beginning/end of terms.

3.4 Curriculum

The Master of Future Cities consists of nine courses. This includes five required courses (no choice), one methods course (choice of two), two thematic electives (choice of six), and one recommended elective, an International Field School. For students unwilling or unable to complete the International Field School, the ninth course may be a third thematic elective or, with instructor and program director permission, any other graduate course offered by the Faculty of Environment.

Short course descriptions for the required, methods, elective and field school courses are included here. Course activation forms for the eleven new FCIT courses are included in Appendix C. FCIT 600 and FCIT 610 are designed as intensive block courses. In the case of FCIT 600, students will spend nine days in Waterloo (seven instructional days plus one weekend for group work and cohort networking) in late August-early September. This time will include the FCIT 600 course content as well as a program orientation and cohort building social activities. FCIT 610 will be an approximately 10 day long in-person international field experience taught at various locations (one per year) outside Canada.

Required Courses:

FCIT 600 Systems, Synergy, Collaboration (in person, block, end of Spring term – beginning of Fall term)
This intensive block course sets the groundwork for students to understand the systemic nature of urban challenges, the complex reality of leading change in volatile circumstances and the power of collaborative engagement to build a sustainable future. Through practice-based learning, students will identify leverage points for change-making as they build their capacity for distributed knowledge and action. They will also develop professional skills required to lead collaborative teams in the context of designing and implementing urban sustainability initiatives. The course is delivered in modules focusing on systems analysis, problem identification in uncertain futures, team collaboration, as well as effective virtual and live engagement and participation processes. Students will build their knowledge of the characteristics of effective strategic decision making in multi-stakeholder contexts.

FCIT 601 Tools for Futures Thinking
Through theory and practice, this progressive project-based course will introduce foresight methods used in the development of strategic proposals related to urban sustainability. Working in teams, students will identify an issue in a specific predefined sector. Their exploration and research begins with a divergent process of signal discovery of emerging issues and trends through methods such as environmental scanning, new technology research, user research, field study, or stakeholder workshops. In a subsequent convergent process, students will then learn and apply methodologies, including medium-to long-range exploratory scenario planning, to develop insights and implications for action. A strategic innovation response will then be stress tested against scenarios to evaluate effectiveness and systemic fit for the defined urban context. Students will develop futures literacy skills to make sense of complex emergence and gain confidence in their ability to frame positive responses to change.

FCIT 602 Future Thinking and Cities
This course focuses on thinking about the future in ways that intersect with the urban phenomenon. It explores visions of the future, including the different objectives, impacts, potential, and limitations of these visions. This course looks at how visions of the future can inform human behaviour as people adapt to possible futures or, indeed, shape the future.

FCIT 603 Sustainable Future Cities
Cities have become the sites of significant sustainability challenges. At the same time, cities represent important assets for catalyzing sustainable development. This course will explore the theories, policies, and actions that have guided cities toward more sustainable futures. This discussion will be framed using the tools provided by systems thinking and futures thinking.

FCIT 620 Future Cities Capstone Project
Guided by faculty, students will work closely with an external partner to develop possible solutions to a specific urban sustainability problem in the form of a professional report. Partner organizations vary from not-for-profit, governmental, and private sector entities. Specifics may vary from year to year.

Recommended:
FCIT 610 International Field School
Building on their learning in Systems and Futures thinking, students will travel to one or more cities that showcase leading-edge sustainability solutions and provide innovative, resilient strategies to prepare for a changing world. The site for the international field school will vary from year to year, but will be outside of Canada. FCIT 610 will have co-instructors – one who is an expert in the futures space, the other may or may not have futures experience but will have lived experience in or familiarity with the destination city[1]. Programming will include site visits, conversations with sustainable city leaders in different sectors (for example transportation, waste management, climate mitigation, housing, public health, food systems) and case study specific learning modules. Supplemental preparatory reference materials will position how the adoption of forward leaning approaches was achieved within specific contextual circumstances. The course is run as an intensive block course.

Methods, one of:
FCIT 607 Data, Methods, and Models for Future Cities
This course is a hands-on introduction to the challenges and opportunities of "big data," computational power, and disruptive technologies (e.g., machine learning, artificial intelligence, and the internet of things) for future cities. It emphasizes contemporary debates about data ethics and politics, with an emphasis on privacy, surveillance, and security. Students will learn how to use Python to manage and analyze data; develop and interpret models; integrate domain experience and expertise from stakeholders; and effectively communicate evidence, risk, and uncertainty to decision-makers.

INDEV 607 Methods for Sustainable Development Practice: A Systems Approach
The course is aimed at enhancing skills useful for development practice. From a systems perspective, students will learn to conceptualize problems using real cases and to analyze them both at the level of structure and dynamics. Problem solving will rely on analytical, heuristic and normative categories and will include learning select methods focusing on sustainability coupled with socio-ecological systems.

[1] Early target cities include Singapore and Amsterdam, but this may change depending on co-instructor experience and destination suitability.

Electives, two of:

FCIT 604 The Socially Just City

This course explores efforts by urban planners, policy-makers and social movement organizations to envision and create socially just cities. Cities emerge through historical power relations, including contradictions between production (capital accumulation) and socio-ecological reproduction. They are places of hope, wealth accumulation, innovation and cultural vibrancy. But, as we will explore, cities are characterized by social struggles over: the uneven distribution of wealth and opportunities; a desire for deeper democratic participation; inequitable access to services and public space; unequal distribution of environmental benefits and harms; increasing state and corporate surveillance; philosophies and practices of security, policing and incarceration; and related discriminatory processes according to people's gender, sexuality, race and ethnicity, ability and (legal) status. We draw on case studies from cities around the world to critically assess progressive policies, programs and grassroots-led initiatives aimed at resolving these conflicts. This course focuses on solutions aimed at: increasing affordable housing and access to public transportation; redistributing wealth (e.g., through tax policy and public ownership); creating good jobs; planning for equity; and deepening participatory urban governance.

FCIT 605 The Future of Work

This advanced graduate seminar examines the emergent possibilities associated with work in cities of the future. It theorizes the central role that work plays in everyday urban life, highlighting how work is spatially and socially unevenly distributed and how inequality continues to structure labor markets in cities. It engages with 'future of work' discourses to examine the complex role of technological change in urban labor market transition, as well as questioning the prominence of technological change in such transition. It focuses both on sectors privileged by mainstream theories of urban development (e.g., high technology and the creative industries) and sectors ignored by such theories but that nevertheless remain essential for the functioning of urban centers, including unpaid, informal, and care work. It questions the role of work in everyday life by highlighting dominant working norms and resistance to them, e.g., in calls for redistributive justice through unionization and collective action, anti-work discourses, and campaigns for a four-day work week.

FCIT 606 Sustainability Transitions in Cities

Sustainability is a multi-faceted and ever-changing collection of aspirations that weaves together environmental integrity, economic prosperity and social equity. The transition to more sustainable cities is both fraught with challenges, including the legacy of unsustainable infrastructure and deeply entrenched habits, but also exciting opportunities and potential for innovation. In this course, we explore the challenge of urban sustainability transitions through a systems lens, exploring the technologies, governance models, values, and behaviours that might trigger and accelerate the transition. We look around the world for compelling examples of sustainability

transitions in practice, from Malmö to Melbourne, and apply the lessons we learn to the Canadian context.

PLAN 684 Physical Infrastructure Planning
This course introduces students to the planning of physical infrastructure. The course covers governments' roles in regulating, financing and maintaining public infrastructure such as transportation or water systems. The impacts of infrastructure provision on land use, the environment, economic development and social equity are also addressed. Quantitative methods of predicting infrastructure demand and utilization are presented. The role of private sector in providing and maintaining infrastructure is discussed.

FCIT 609 Mobility Futures
Taking a systems approach, this course focuses on exploratory mobility futures with an emphasis on personal transportation in urban areas. Technological innovation and transport automation and their interactions with socio-demographics, the nature of work, land use planning, and energy systems are used to develop scenarios of different plausible futures and for identifying the challenges and opportunities that may emerge.

PLAN 606 Modelling the City
This course examines the use of computer modelling and simulation in the realm of urban analysis and forecasting, with the goal of understanding urban land-use change trajectories. Topics include an overview of the drivers and consequences in urban land-use change, the role of models, an overview of current methodological approaches, and an examination of urban simulation models as used in the development of urban policies and official plans. This course provides an applied learning environment in which students will gain experience in the use of spatial (GIS) modelling approaches.

ARCH 6XX Critical Engagements with Urban Technology
When we think about technologically mediated urban environments or projects, two narratives dominate: On the one hand, techno-utopian hype propels visions of optimized, sustainable, frictionless urbanisms, on the other hand, singularly pessimistic accounts of unjust algorithms and digital surveillance eclipse technology’s potential in supporting socially minded urban transformation. This course is situated in the territory between these opposing poles – embracing technology as a powerful tool with the capacity to address the needs of citizens while simultaneously recognizing technology’s incessant capacity to undermine efforts to creating a more just world.

3.5 Collateral and Supporting Departments

The MFC is a course-based program without a thesis or Masters Research Paper component. All supervision will be done as part of course experiences, e.g., the FCIT 620 Applied Capstone course will require students to work with the course instructor, alone or in groups.

Almost all faculty have their primary home in one of the units of the Faculty of Environment, and, in most cases, thematic electives and methods courses will also be available to students in the instructor's home graduate program. Core courses will only be available to Future Cities students, and the home units have agreed to make instructor time to deliver these courses available.

3.6 Organizational Structure

The MFC will be housed at the Faculty Level in Environment. The Program will have a Program Director, who will oversee recruitment, admissions and academic progression. The Program Director will be supported by a 0.5 FTE Graduate Program Administrator. The Program Director will normally be recruited from among the faculty members actively teaching in the program.

One of the thematic electives, ARCH 6XX, represents a contribution from the School of Architecture in the Faculty of Engineering. There are no other institutions involved in the development or delivery of the MFC.

4. PROJECTED ENROLMENT

It is hoped that the program can start in Fall 2023. Enough courses will be in place such that both part-time and full-time students entering in the first cohort can complete the program.

Enrolment in Year 1 is targeted at 12 new students (7 part-time and 5 full-time), increasing to an annual intake of 25-35 students (~70% part-time and 30% full-time), once steady-state is achieved in the 7th year of the program (class entering in 2029); 90% of enrolment is expected to be domestic.

Table 5 Projected Intake and Enrolment

Projected Student Intake and Enrolment								
Academic Year	FULL-TIME				PART-TIME (based on completion in 8 terms)			
	Year One Intake		Total FT Fiscal Year Enrolment[1]		Year One Intake		Total PT Fiscal Year Enrolment	
	Domestic	International fee-paying	Domestic	International fee-paying	Domestic	International fee-paying	Domestic	International fee-paying
2023-24	5	0	9.7	0	6	1	11.6	1.9
2024-25	6	0	16.1	0	9	2	32.1	6.3
2025-26	7	0	19.0	0	11	2	52.8	10.3
2026-27	8	0	21.8	0	13	2	66.4	11.9
2027-28	8	0	22.7	0	15	3	78.3	13.9
2028-29	8	0	22.7	0	17	3	90.2	16.3
2029-30	8	0	22.7	0	19	3	102.2	17.9

[1] Fiscal year enrolment is the total student enrolment over the three terms in the fiscal year (Spring + Fall + Winter). Note that student retention is estimated using existing transitions for the Master of Environment & Business and numbers are rounded to one decimal place. Full-time enrolment is based on program completion in 3 terms and part-time enrolment is based on completion in 8 terms.

5. FINANCIAL PLAN

A financial viability analysis (FVA) of the financial parameters and assumptions of the proposed program was conducted by Institutional Analysis and Planning (IAP) and discussed in detail with the Faculty Environment. IAP has not identified significant financial challenges to this proposal moving forward with the proposed enrolment, tuition rate, and costs outlined in the FVA. The financial viability analysis was approved by the Provost on February 13th, 2022.

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

Specific GDLEs and Associated Learning Outcomes		Course														Assessment method							
	FCIT 600	FCIT 601	FCIT 602	FCIT 603	FCIT 620	FCIT 610	FCIT 607	INDEV 607	PLAN 606	FCIT 604	FCIT 605	FCIT 606	ARCH 6XX	PLAN 684	FCIT 609	Forum communication	Class discussions	Quizzes/Tests	Written assignments/ arguments/policy briefs	Data interpretation, synthesis, visualization	Technical reports/plans	Slide decks/presentations	Peer/article review
1. Depth and Breadth of Knowledge																							
Interdisciplinary knowledge of the concepts, information, and techniques relevant to futures studies, sustainability, and cities																							
Develop a futures thinking lens incorporating systems thinking and sustainability	✓	✓		✓			✓	✓	✓		✓						✓		✓	✓	✓	✓	
Understand and apply strategic decision-making methods that emphasize uncertainty and incorporate futures studies		✓		✓			✓								✓		✓			✓	✓	✓	✓
Explain and examine city systems and their major challenges			✓			✓				✓	✓	✓	✓	✓	✓	✓			✓			✓	✓
Explain and apply sustainability, systems thinking and futures studies in the context of city challenges and urban futures			✓	✓							✓				✓		✓		✓	✓	✓	✓	

Specific GDLEs and Associated Learning Outcomes	Course															Assessment method								
	FCIT 600	FCIT 601	FCIT 602	FCIT 603	FCIT 620	FCIT 610	FCIT 607	INDEV 607	PLAN 606	FCIT 604	FCIT 605	FCIT 606	ARCH 6XX	PLAN 684	FCIT 609	Forum communication/	Multi-part assignments	Quizzes/Tests	Written assignments/ arguments/policy briefs	Data interpretation, synthesis, visualization	Technical reports/plans	Slide decks/presentations	Peer/article review
2. Research & Scholarship																							
Demonstrate a conceptual understanding and methodological competence that enables the critical interpretation of current research findings and the application of research techniques specific to futures studies, sustainability, and cities																							
Describe and consider the tools and methods used to collectively envision, imagine, and respond to urban futures	✓	✓	✓	✓			✓	✓	✓			✓				✓	✓		✓	✓	✓	✓	
Analyze and interrogate current research on futures studies, sustainability, and selected city challenges		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
Explain, assess, and generate futures responses to complex city challenges		✓	✓	✓							✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

Specific GDLEs and Associated Learning Outcomes	Course															Assessment method							
	FCIT 600	FCIT 601	FCIT 602	FCIT 603	FCIT 620	FCIT 610	FCIT 607	INDEV 607	PLAN 606	FCIT 604	FCIT 605	FCIT 606	ARCH 6XX	PLAN 684	FCIT 609	Forum communication/ Class	Multi-part assignments	Quizzes/Tests	Written assignments/ arguments/policy briefs	Data interpretation, synthesis, visualization	Technical reports/plans	Slide decks/presentations	Peer/article review
3. Level and Application of Knowledge																							
Demonstrate competence in the application of an existing body of knowledge through research and critical analysis that addresses future cities challenges																							
Explain, utilize, and critique data relevant to current and future city challenges		✓		✓	✓	✓	✓						✓			✓			✓	✓	✓	✓	
Design and conduct research applying futures, systems, and sustainability to real-world complex city challenges			✓	✓	✓	✓	✓								✓	✓			✓	✓	✓	✓	
Collaboratively develop pro-active interdisciplinary solutions to future city challenges		✓		✓	✓	✓	✓			✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	

Specific GDLEs and Associated Learning Outcomes		Course														Assessment Method							
	FCIT 600	FCIT 601	FCIT 602	FCIT 603	FCIT 620	FCIT 610	FCIT 607	INDEV 607	PLAN 606	FCIT 604	FCIT 605	FCIT 606	ARCH 6XX	PLAN 684	FCIT 609	Forum communication/ Class discussions	Multi-part assignments	Quizzes/Tests	Written assignments/ arguments/policy briefs	Data interpretation, synthesis, visualization	Technical reports/plans	Slide decks/presentations	Peer/article review
4. Professional Capacity/Autonomy																							
Demonstrate professional capacity and autonomy, through ethical behavior consistent with academic integrity and research guidelines, personal initiative, responsibility, and sound decision-making in diverse academic and professional situations.																							
Demonstrate professionalism through personal initiative and responsibility in all aspects of the classroom, laboratory, team projects, field school, and capstone work.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
Demonstrate the ability to work effectively in interdisciplinary teams on problems relating to urban futures	✓	✓			✓	✓	✓	✓				✓			✓	✓			✓	✓	✓	✓	
Take a proactive and self-reflective approach to develop professional networks and relationships inside and outside the program.	✓			✓	✓	✓		✓				✓			✓	✓			✓		✓	✓	

Specific GDLEs and Associated Learning Outcomes		Course														Assessment Method							
	FCIT 600	FCIT 601	FCIT 602	FCIT 603	FCIT 620	FCIT 610	FCIT 607	INDEV 607	PLAN 606	FCIT 604	FCIT 605	FCIT 606	ARCH 6XX	PLAN 684	FCIT 609	Forum communication/ Class discussions	Multi-part assignments	Quizzes/Tests	Written assignments/ arguments/policy briefs	Data interpretation, synthesis, visualization	Technical reports/plans	Slide decks/presentations	Peer/article review
5. Level of Communications Skills																							
Demonstrate effective communication of ideas, results and conclusions in visual, oral and written forms.																							
Demonstrate competency to effectively communicate complex problems including technical challenges, social, environmental, sustainability, justice, equity and economic issues, in a variety of contexts and diverse expert and non-expert audiences.		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓					✓			
Be able to produce a range of written communication products for varied audiences.		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓		
Apply techniques to improve confidence and effectiveness in professional speaking and presentation skills in all communications within the program.	✓	✓		✓	✓	✓					✓	✓				✓						✓	
6. Awareness of Limits of Knowledge																							
Be cognizant of the complexity, uncertainty and limitations of knowledge related to future urban systems																							
Have appreciation for the inherent uncertainties in projecting and predicting future urban systems.	✓	✓	✓	✓	✓	✓	✓					✓	✓		✓		✓	✓	✓	✓	✓	✓	
Develop an openness to alternative thinking, values, viewpoints and systems across the subject domains of the MFC.	✓	✓	✓	✓	✓	✓		✓							✓	✓			✓	✓	✓		

Course/Assessment Matrix

Course	Forum communication/ Class discussions	Multi-part assignments	Quizzes/Tests	Written assignments/ arguments/policy briefs	Data interpretation, synthesis, visualization	Technical reports/plans	Slide decks/presentations	Peer/article review
FCIT 600	✓			✓	✓		✓	
FCIT 601	✓	✓		✓	✓	✓	✓	
FCIT 602				✓		✓		✓
FCIT 603	✓	✓	✓	✓		✓		
FCIT 620	✓			✓	✓	✓	✓	
FCIT 610	✓			✓	✓	✓	✓	
FCIT 607	✓	✓		✓	✓	✓		
INDEV 607	✓			✓	✓	✓		✓
PLAN 606	✓		✓	✓		✓		✓
FCIT 604	✓			✓				✓
FCIT 605	✓	✓		✓			✓	✓
FCIT 606	✓	✓		✓		✓	✓	✓
ARCH 6XX	✓	✓			✓		✓	✓
PLAN 684			✓			✓	✓	
FCIT 609				✓	✓	✓	✓	

Appendix B
Job Posting – Caivan Communities Future Cities Professor

Assistant/Associate professor (tenure-track) in Future Studies with application to Cities

The Faculty of Environment, University of Waterloo, invites applications for a tenure-track faculty position at the rank of Assistant Professor or Associate Professor (salary range $90,000 to $150,000 per annum) with an anticipated start date of July 1, 2021, or shortly thereafter. The successful applicant will be jointly appointed to both the Faculty of Environment and the School of Planning as the inaugural “Caivan Communities Future Cities Professor.”

We seek an energetic and dynamic scholar with demonstrated potential for leading academic programing and research related to future studies in the area of cities. Applicants should have an interest to study and critically evaluate plausible futures and their broader societal implications, and to contribute to scholarship and contemporary decision making in planning and/or broader public policy related to cities and their diverse inhabitants. We are particularly interested in applicants who employ interdisciplinary, futurist approaches to study the technology-human interface, society-environment interactions, and societal transitions as they apply to cities.

A demonstrated ability to forge and sustain fruitful partnerships with scholars from a variety of disciplines, as well as demonstrated excellence in teaching, are considered assets. We welcome individuals of all disciplinary backgrounds to apply.

Potential candidates should have a record of excellence in research and must be able to demonstrate a strong interest and ability to communicate to undergraduate and graduate students and to wider audiences, plus a keenness to mentor students effectively. Candidates are invited to submit an application including:

• an updated and complete curriculum vitae.
• a letter of interest (maximum 4 pages) outlining:

1. their qualifications for the position;
2. the fit of their profile and expertise with the advertised position;
3. their vision and future research program;
4. their potential to enhance the scholarship and capacity of the University and Faculty in strategic ways;
5. the names and contact information of three referees. [References will only be requested for applicants invited for an interview.]

The University of Waterloo is located in the Region of Waterloo: a mid-sized and rapidly growing area about an hour's drive west of Toronto's Pearson Airport. The University of Waterloo is a leader in the education of global citizens, with current efforts focusing on

promoting Indigenous scholarship, and creating opportunities with and for racialized campus community members. The University celebrates diversity through intersectionality informed initiatives for students, faculty and staff who identify as racialized, Indigenous, women, a person with a disability and/or LGBTQ2+. The University seeks candidates who embrace these goals of diversity and inclusion. The selection committee will be especially attentive to and respectful of the lived experiences of applicants.

All qualified candidates are encouraged to apply; however, Canadian citizens and permanent residents will be given priority.

The Faculty of Environment is a world leader in interdisciplinary research and teaching on the environment and sustainability. The Faculty is the home of five academic units: Department of Geography and Environmental Management; Department of Knowledge Integration; School of Environment, Enterprise and Development; School of Environment, Resources and Sustainability, and School of Planning. The Faculty is a dynamic and vibrant academic environment with ~ 100 faculty members, 50 staff, 2400 undergraduate students and 600 graduate students.

The School of Planning, housed in the Faculty of Environment, is at the forefront of planning research and teaching, characterized by a comprehensive, applied, critical, and interdisciplinary approach to planning with vibrant ties to the profession. Home to over 400 undergraduate students, 80 graduate students and 20 faculty members, the School offers undergraduate and Master's degrees accredited by the Professional Standards Board (PSB) for the profession, as well as an on-line professional Master's degree and a doctoral program.

If you have any questions regarding the position, the application process, assessment process, eligibility, or a request for accommodation during the hiring process, please contact Sheree Solomon at ssolomon@uwaterloo.ca.

Closing date for receipt of applications is February 28, 2021, and the application package should be addressed to:

Dean, Jean Andrey
Faculty of Environment
University of Waterloo
200 University Avenue West
Waterloo, ON, Canada, N2L 3G1

or may be submitted electronically to env-dean@uwaterloo.ca

Three reasons to apply: https://uwaterloo.ca/faculty-association/why-waterloo

Appendix C
Course Activation Forms for new FCIT Courses

Graduate Studies
New Program Template

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

Faculty: Environment

Program: Master of Future Cities (MFC)

Program contact name(s): Johanna Wandel

Form completed by:

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

Proposed effective date: Term: Fall Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/environment

Proposed Graduate Studies Academic Calendar content:

MASTER OF FUTURE CITIES (MFC)

Program information

- **Admit term(s)**
  - Fall
- **Delivery mode**
  - Online
- **Delivery mode information**
  - The program is offered online and includes an on-campus component.
- **Length of program**
  - Full-time: 3 terms (12 months)
  - Part-time: 6-8 terms (18-24 months)
- **Program type**
  - Master's
  - Professional
- **Registration option(s)**
  - Full-time
  - Part-time
- **Study option(s)**

Proposed Graduate Studies Academic Calendar content:

- Coursework

Admission requirements

- **Minimum requirements**
  - A four-year Honours Bachelor degree (or equivalent) in any humanities, social science, health, business, engineering or science discipline with an overall average of at least 75% in the last 20 courses (or last two years).

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

- **References**
  - Number of references: 2
  - Type of references: academic or professional

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

Degree requirements

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

- **Courses**
  - Students must complete the following 9 courses:
  - Required:
    - FCIT 600 Cities, Systems, Synergy and Collaboration
    - FCIT 601 Tools for Futures Thinking
    - FCIT 602 Future Thinking and Cities
    - FCIT 603 Sustainable Future Cities
    - FCIT 620 Future Cities Capstone Project
  - Recommended:
    - FCIT 610 International Field School (for students unwilling or unable to participate, any other FCIT elective or open graduate level elective from online offerings in the Faculty of Environment may be substituted)
  - 1 of the following methods courses:
    - FCIT 607 Data, Methods, and Models for Future Cities
    - INDEV 607 Methods for Sustainable Development Practice: A Systems Approach
  - 2 of the following elective courses:
    - ARCH 6XX Critical Engagements with Urban Technology
    - FCIT 604 The Socially Just City
    - FCIT 605 The Future of Work
    - FCIT 606 Sustainability Transitions in Cities
    - FCIT 609 Mobility Futures
    - PLAN 606 Modeling the City
    - PLAN 684 Physical Infrastructure and Planning
  - Students must maintain a minimum 75% cumulative average over the course of the program in order to graduate. A failing grade in any course will occasion an automatic review of the student's status by the Program Director and may in some cases, result in the requirement to withdraw from the program.

Departmental approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 600

Course ID:

Course title (max. 100 characters including spaces): Systems, Synergy, Collaboration

Course short title (max. 30 characters including spaces): Systems, Synergy, Collaboration

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: This intensive block course sets the groundwork for students to understand the systemic nature of urban challenges, the complex reality of leading change in volatile circumstances and the power of collaborative engagement to build a sustainable future. Through practice-based learning, students will identify leverage points for change-making as they build their capacity for distributed knowledge and action. They will also develop professional skills required to lead collaborative teams in the context of designing and implementing urban sustainability initiatives. The course is delivered in modules focusing on systems analysis, problem

identification in uncertain futures, team collaboration, as well as effective virtual and live engagement and participation processes. Students will build their knowledge of the characteristics of effective strategic decision making in multi-stakeholder contexts.

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

Primary meet type: Seminar

Delivery mode: On-campus

Requisites: Master of Future Cities students only.

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 601

Course ID:

Course title (max. 100 characters including spaces): Tools for Futures Thinking

Course short title (max. 30 characters including spaces): Tools for Futures Thinking

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: Through theory and practice, this progressive project-based course will introduce foresight methods used in the development of strategic proposals related to urban sustainability. Working in teams, students will identify an issue in a specific predefined sector. Their exploration and research begins with a divergent process of signal discovery of emerging issues and trends through methods such as environmental

scanning, new technology research, user research, field study, or stakeholder workshops. In a subsequent convergent process, students will then learn and apply methodologies, including medium-to long-range exploratory scenario planning, to develop insights and implications for action. A strategic innovation response will then be stress tested against scenarios to evaluate effectiveness and systemic fit for the defined urban context. Students will develop futures literacy skills to make sense of complex emergence and gain confidence in their ability to frame positive responses to change.

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

Primary meet type: Seminar

Delivery mode: Only offered online

Requisites: Master of Future Cities students only / FCIT 600

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 602

Course ID:

Course title (max. 100 characters including spaces): Future Thinking and Cities

Course short title (max. 30 characters including spaces): Future Thinking and Cities

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: This course focuses on thinking about the future in ways that intersect with the urban phenomenon. It explores visions of the future, including the different objectives, impacts, potential, and limitations of these visions. This course looks at how visions of the future can inform human behaviour as people adapt to possible futures or, indeed, shape the future.

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

Primary meet type: Lecture

Delivery mode: Only offered online

Requisites: Master of Future Cities students only / FCIT 600

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 603

Course ID:

Course title (max. 100 characters including spaces): Sustainable Future Cities

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: Cities have become the sites of significant sustainability challenges. At the same time, cities represent important assets for catalyzing sustainable development. This course will explore the theories, policies, and actions that have guided cities toward more sustainable futures. This discussion will be framed using the tools provided by systems thinking and futures thinking.

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

Primary meet type: Lecture

Delivery mode: Only offered online

Requisites: Master of Future Cities students only / FCIT 600 and FCIT 601

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 620

Course ID:

Course title (max. 100 characters including spaces): Future Cities Capstone Project

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: Guided by faculty, students will work closely with an external partner to develop possible solutions to a specific urban sustainability problem in the form of a professional report. Partner organizations vary from not-for-profit, governmental, and private sector entities. Specifics may vary from year to year.

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

Primary meet type: Seminar

Delivery mode: Only offered online

Requisites: Master of Future Cities students only / FCIT 600 and FCIT 601 and FCIT 602 and FCIT 603

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 610

Course ID:

Course title (max. 100 characters including spaces): International Field School

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: Building on their learning in Systems and Futures thinking, students will travel to one or more cities that showcase leading-edge sustainability solutions and provide innovative, resilient strategies to prepare for a changing world. The site for the international field school will vary from year to year, but will be outside of Canada. FCIT 610 will have co-instructors – one who is an expert in the futures space, the other may or may not have futures experience but will have lived experience in or familiarity with the destination city.

Programming will include site visits, conversations with sustainable city leaders in different sectors (for example transportation, waste management, climate mitigation, housing, public health, food systems) and case study specific learning modules. Supplemental preparatory reference materials will position how the adoption of forward leaning approaches was achieved within specific contextual circumstances. The course is run as an intensive block course. Note: this course will include an additional field trip fee to cover the cost of travel and accommodation, the amount will vary depending on the location.

Meet type(s): Field studies Seminar Lecture Choose an item.

Primary meet type: Field studies

Delivery mode: On-campus (in person / field location)

Requisites: Master of Future Cities students only / FCIT 600 and FCIT 601

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 607

Course ID:

Course title (max. 100 characters including spaces): Data, Methods, and Models for Future Cities

Course short title (max. 30 characters including spaces): Data, Methods, & Models

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: This course is a hands-on introduction to the challenges and opportunities of "big data," computational power, and disruptive technologies (e.g., machine learning, artificial intelligence, and the internet of things) for future cities. It emphasizes contemporary debates about data ethics and politics, with an emphasis on privacy, surveillance, and security. Students will learn how to use Python to manage and analyze data; develop

and interpret models; integrate domain experience and expertise from stakeholders; and effectively communicate evidence, risk, and uncertainty to decision-makers.

Meet type(s): Lecture Lab Choose an item. Choose an item.

Primary meet type: Lecture

Delivery mode: Only offered online

Requisites: Master of Future Cities students / FCIT 600 and FCIT 601

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 604

Course ID:

Course title (max. 100 characters including spaces): The Socially Just City

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: This course explores efforts by urban planners, policy-makers and social movement organizations to envision and create socially just cities. Cities emerge through historical power relations, including contradictions between production (capital accumulation) and socio-ecological reproduction. They are places of hope, wealth accumulation, innovation and cultural vibrancy. But, as we will explore, cities are characterized by social struggles over: the uneven distribution of wealth and opportunities; a desire for deeper democratic

participation; inequitable access to services and public space; unequal distribution of environmental benefits and harms; increasing state and corporate surveillance; philosophies and practices of security, policing and incarceration; and related discriminatory processes according to people's gender, sexuality, race and ethnicity, ability and (legal) status. We draw on case studies from cities around the world to critically assess progressive policies, programs and grassroots-led initiatives aimed at resolving these conflicts. This course focuses on solutions aimed at: increasing affordable housing and access to public transportation; redistributing wealth (e.g., through tax policy and public ownership); creating good jobs; planning for equity; and deepening participatory urban governance.

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

Primary meet type: Lecture

Delivery mode: Only offered online

Requisites:

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 609

Course ID:

Course title (max. 100 characters including spaces): Mobility Futures

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: Taking a systems approach, this course focuses on exploratory mobility futures with an emphasis on personal transportation in urban areas. Technological innovation and transport automation and their interactions with socio-demographics, the nature of work, land use planning, and energy systems are used to develop scenarios of different plausible futures and for identifying the challenges and opportunities that may emerge.

Meet type(s): Lecture Lab Choose an item. Choose an item.

Primary meet type: Lecture

Delivery mode: Only offered online

Requisites:

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

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

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 03/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 605

Course ID:

Course title (max. 100 characters including spaces): The Future of Work

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: This advanced graduate seminar examines the emergent possibilities associated with work in cities of the future. It theorizes the central role that work plays in everyday urban life, highlighting how work is spatially and socially unevenly distributed and how inequality continues to structure labor markets in cities. It

engages with ‘future of work’ discourses to examine the complex role of technological change in urban labor market transition, as well as questioning the prominence of technological change in such transition. It focuses both on sectors privileged by mainstream theories of urban development (e.g., high technology and the creative industries) and sectors ignored by such theories but that nevertheless remain essential for the functioning of urban centers, including unpaid, informal, and care work. It questions the role of work in everyday life by highlighting dominant working norms and resistance to them, e.g., in calls for redistributive justice through unionization and collective action, anti-work discourses, and campaigns for a four-day work week.

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

Primary meet type: Seminar

Delivery mode: Only offered online

Requisites: Master of Future Cities and Geography Graduate students only
Antireq: GEOG 693 Topic 3

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☒ No ☐

Course subject code(s) and number(s) to be cross-listed with and approval status: GEOG 622 (approved by SGRC December 12, 2022).

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/22/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Senate Graduate & Research Council
Graduate Studies Course/Milestone Form

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

Faculty: Environment

Effective date: Term: Spring Year: 2023

Milestone

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

☐ New: Choose an item.

☐ Inactivate: Choose an item.

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

Course

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

☒ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☐ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

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

Course subject code: FCIT

Course number: 606

Course ID:

Course title (max. 100 characters including spaces): Sustainability Transitions in Cities

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

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description: Sustainability is a multi-faceted and ever-changing collection of aspirations that weaves together environmental integrity, economic prosperity and social equity. The transition to more sustainable cities is both fraught with challenges, including the legacy of unsustainable infrastructure and deeply entrenched habits, but also exciting opportunities and potential for innovation. In this course, we explore the challenge of urban

sustainability transitions through a systems lens, exploring the technologies, governance models, values, and behaviours that might trigger and accelerate the transition. We look around the world for compelling examples of sustainability transitions in practice, from Malmö to Melbourne, and apply the lessons we learn to the Canadian context.

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

Primary meet type: Lecture

Delivery mode: Only offered online

Requisites: Master of Future Cities and Master of Climate Change students only

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☒ No ☐

Course subject code(s) and number(s) to be cross-listed with and approval status: GEMCC 653 (approved by SGRC December 12, 2022).

Sections combined/held with:

Rationale for request:

New course for Master of Future Cities program.

Form completed by: Johanna Wandel
Department/School approval date (mm/dd/yy):
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 07/28/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

UNIVERSITY OF
WATERLOO

NEW GRADUATE PROGRAM PROPOSAL

OF

MASTER

IN

FUTURE CITIES

Submitted to the
Ontario Universities Council on Quality Assurance

VOLUME II – FACULTY CURRICULA VITAE

DECEMBER 2022

CURRICULA VITAE
TABLE OF CONTENTS

CV's can be found here

EXTERNAL REVIEWERS' REPORT FOR NEW PROGRAMS

Reviewers' Report on the Masters of Future Cities Program at the University of Waterloo.

Richard Shearmur
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EXECUTIVE SUMMARY

The proposed master of Future Cities Program is an innovative and academically solid program inviting graduate students – mainly those already engaged in a career – to master the theory and concepts necessary to understand how cities work as, and as part of, complex systems. This is done in order to envisage likely, possible, desirable and/or avoidable futures, which help decision makers think beyond the immediate constraints of regulations, popular current ideas, and embedded assumptions. Future studies, an area of study that is not much covered in Canadian universities – especially with respect to cities – provides a framework for this thinking. Once these theory and concepts are mastered, they are then applied and/or extended by way of a capstone project, elective courses and a field course.

Leadership of the program is ensured by a director, by two dedicated faculty members (one tenure-track professor and one instructor), and by faculty drawn from departments across the Faculty of the Environment. The academic leadership and faculty are enthusiastic about the program and eminently qualified to lead and deliver it.

The program is a faculty-level program – it sits within the Faculty of the Environment, not within a specific department or School

Our remarks and suggestions relate to certain administrative and practical questions, as well as to the nature of the market the program is addressing. A brief list is provided here, and elaborated at the end of the report.

Higher priority

- *dedicated administrative support staff*
- *review and expand teaching release for director*
- *perform market research to ensure program targets its prospective students strategically*

• curate admissions to try to ensure a diversity of backgrounds and skills within each student cohort

Other suggestions and questions

• think through benefits and costs of locating program at the Faculty level as opposed to within a department

• instructors are drawn from other Faculties: can their involvement in the program be guaranteed?

• how would international students access hard-copy material from libraries?

• consider opening elective courses to graduate students from other programs to ensure critical mass and efficient use of teaching resources

1. DETAILS OF THE SITE VISIT

- *The site visit was a virtual site visit.*
- *This format was agreed to by both external reviewers.*
- *Sufficient rationale was provided by the Provost/Provost's delegate for an off-site visit.*

1.1 Outline of the Visit

The virtual site visit took place during the week of 19th to 23rd September. It consisted of 13 meetings held over four days, with each meeting lasting 30 to 45 minutes, except a brief wrap up meeting with the program director that lasted 15 minutes.

Participants: The following people were met:

- *Jeff Casello, Associate Vice-President, Graduate Studies and Postdoctoral Affairs*
- *Amanda McKenzie, Director, Quality Assurance*
- *Johanna Wandel, Associate Dean Undergraduate Studies*
- *Jean Andrey, former Dean of Environment*
- *Peter Deadman, Associate Dean Graduate Studies*
- *Leia Minaker (School of Planning), incoming program director*
- *Clarence Woudsma (School of Planning)*
- *Helen Kerr, Lecturer (Faculty of Environment) – core faculty*
- *Marta Berbes, Assistant Professor (Faculty of Environment/School of Planning) - core faculty*
- *Cameron McCordic (Assistant Professor, School of Enterprise, Environment and Development)*
- *Pierre Filion (Professor Emeritus, School of Planning)*
- *Simron Singh (Professor, School of Enterprise, Environment and Development)*
- *John McLevey (Associate Professor, Knowledge Integration)*
- *Sarah Burch (Associate Professor, Geography and Environmental Management/ Executive Director, Waterloo Climate Institute)*
- *Nancy Worth (Associate Professor, Geography and Environmental Management)*
- *Dan Cockayne (Associate Professor, Geography and Environmental Management)*
- *Maya Przybylski (tentative, Interim Director, School of Architecture*

- *Nancy Collins, Head, Information Services and Resources, Dana Porter Library*
- *Marian Davies, Subject Librarian, Planning*
- *James Rush, Vice-President, Academic and Provost*
- *Bruce Frayne, Dean of Environment*
- *Angela Christelis, Coordinator, Quality Assurance*

Facilities: As the visits were conducted virtually over Microsoft Teams, no facilities were visited. (We did, however, meet with library staff and discussed library facilities, including how students in this largely online program would access library resources remotely.)

The full site visit schedule can be found in Appendix A.

1.2 Effectiveness

In order to continuously improve the effectiveness and efficiency of site visits, please comment on the following:

- How effective was the self-study in preparing you for the visit?

  • The information provided was fine. Prior to the review we had been provided with two key documents (i. The Program proposal; ii. CVs of all faculty involved) as well as the template for this report. We have also been provided with a document positioning this programme relative to other programs in Canada and elsewhere. The reviewers were sufficiently prepared.

- How could the logistics of the visit be improved?

  • No improvements needed in terms of logistics. A practice meeting was held to test technology on the Friday before the Monday start of the site visit. The online visits went very well. The links worked (!), everyone was punctual, and sufficient pauses and breaks were worked into the schedule to make it bearable for the reviewers. It is believed that the virtual site visits are more efficient than onsite visits as they reduce the travel burden for participants (especially external reviewers), and they are likely more effective overall.

2. EVALUATION CRITERIA

2.1 Objectives

For the following Yes/No questions, if 'No', please explain.

- Are the program's objectives clearly described? *YES*
- Is the degree nomenclature appropriate, given the program's objectives? *YES*
- Is the program consistent with the University of Waterloo's mission and relevant

academic strategic plans? *YES*

2.2 Program Requirements

NOTE: The Quality Assurance Framework requires a clear distinction between program objectives, program-level learning outcomes, and Degree Level Expectations*. Please see the Guidance on* Program Objectives and Program-level Learning Outcomes *for details on the distinction.*

For the following Yes/No questions, if 'No', please explain.

- Are the program's structure and the requirements to meet program objectives and program-level learning outcomes appropriate? *YES*

- Are the program's structure, requirements and program-level learning outcomes
    - in alignment with the University of Waterloo's Undergraduate or Graduate Degree Level Expectations? *YES*
    - clear and appropriately communicated? *YES*

- Is the mode of delivery appropriate in facilitating students' successful completion of the program-level learning outcomes? *YES*

- What are the ways in which the curriculum addresses the current state of the discipline or area of study? *Please explain.*

    • Future studies is an area of study that is not much covered in Canadian universities – especially with respect to cities. The proposed program integrates systems and futures thinking throughout the program and engages students with alternative visions of future cities developed from multiple perspectives. The curriculum addresses the current state of studies on future cities by beginning with foundational core courses on the theories and concepts in future studies, then working through additional core courses and electives which allow students to explore key issues of sustainable, resilient, and equitable cities. Theories and concepts are also applied and/or extended by way of a capstone project and a field course.

- Do the program name and credential earned (e.g., BA, MSc, PhD, etc.)
    - reflect the content of the program? *YES*
    - advance the program's objectives? *YES*

2.3 Program Requirements for graduate programs only

- Is there a clear rationale for the program length that ensures that program requirements can be reasonably completed within the proposed time period? *YES*

- Is there evidence that graduate students required to take a minimum of two-thirds of the course requirements from among graduate-level courses? *YES*

- Is there a clear indication of the nature and suitability of the major research requirements for degree completion? YES

2.4 Assessment of teaching and learning (QAF 5.1.3.1.4)

NOTE: Programs should ensure that the plans for monitoring and assessing student achievement provide an assessment of students currently enrolled as well as post-graduation metrics. Please see Guidance on Assessment of Teaching and Learning for further details and examples of measures for assessing teaching and learning that meet the requirements of the Quality Assurance Framework.

For the following Yes/No questions, if 'No', please explain.

- Are the methods used to assess student achievement of the program-level learning outcomes and Degree Level Expectations appropriate and effective? *YES*

- Are the plans in place to monitor and assess the following, both appropriate and effective?

The overall quality of the program;

i. Whether the program is achieving in practice its proposed objectives; *YES*

ii. Whether its students are achieving the program-level learning outcomes; *YES*

iii. How the resulting information will be documented and subsequently used to inform continuous program improvement.

• There are some plans in place to monitor overall program success, including an exit survey and 5-year post-graduation survey, as well as the formation of an alumni group on LinkedIN as a dynamic resource for periodically seeking advice. However, it is currently unclear how this information will be used to inform continuous program improvement. As this is a new program, it is suggested that monitoring begin at program launch with an entrance survey to assess student expectations and their baseline knowledge in relation to learning outcomes. The director could collect and monitor this information each year.

2.5 Admission requirements (QAF 5.1.3.1.5)

For the following Yes/No questions, if 'No', please explain.

- Are admission requirements appropriate, given the program's objectives and program-level learning outcomes? NO (see below)

- Are there any applicable alternative admission requirements, including how the program recognizes prior work or learning experience, and if so, are they appropriate? NO

• The admissions requirements are adequate, as a start, but some thought needs to go in to thinking about how mid-career professionals can be admitted with recognition being given to their career achievements, not solely on the basis of undergraduate transcripts (especially given that grade inflation has been occurring in Canadian institutions over time). It may be that the 75% GPA requirement is fine (we recognize that evidence of academic capacity is required), but that thought needs to go into how students will be selected after achieving this baseline.

• This links in with, but is distinct from, the need to curate entrance cohorts to ensure a diversity of skills and backgrounds, and to enhance the program's interdisciplinarity. This should be done by an admissions committee of core faculty, including (but not limited to) the director.

2.6 Resources (QAF 5.1.3.1.6)

NOTE: Recommendations on issues such as faculty complement, space requirements and/or other elements that are within the purview of the university's internal budgetary decision-making process must be tied directly to issue of program quality or sustainability.

For the following Yes/No questions, if 'No', please explain.

Given the program's class sizes and cohorts as well as its program-level learning outcomes:

a) Is there a sufficient number and quality of core faculty who are competent to teach and/or supervise sufficient to achieve the goals of the program and foster the appropriate academic environment?

*• Yes. However, the availability of these faculty members depends on their department heads and on their departmental duties: these must account for their involvement in the Future Cities program. It is important to ensure that faculty members **remain** available to the program in the medium term*

b) When adjunct/sessional faculty play a large role in the delivery of the program, is their role suitable? Are plans in place to ensure the sustainability of the program and the quality of student experience and if so, are these suitable?

• One part-time lecturer has been hired as a core faculty in this program. Although not tenure-track, this part-time 'practitioner in residence' position appears to be continuing and will not negatively impact sustainability of the program. As a 'professional futurist' this lecturer is highly qualified and brings important dimensions to the program, thus there are no reservations about the suitability of their role.

c) Is the provision of supervision of experiential learning opportunities adequate? *YES*

d) Comment on the administrative unit's planned use of existing human, physical and financial resources, including implications for other existing programs at the university.

• *The academic human resources dedicated to the program are well qualified for the task and in sufficient number. It will be necessary to ensure that dedicated administrative staff are there to support the director and the students. The director, especially during the first few years when the program will be running through its normal teething problems, will probably need a more generous course release.*

e) Are there adequate resources available to sustain the quality of scholarship and research activities produced by students, including library support, information technology support, and laboratory access?

• *The library services are fine and well suited to the program. As we noted above, adequate and dedicated administrative support is necessary.*

2.7 Resources for Graduate Programs Only (QAF 5.1.3.1.7):

For the following Yes/No questions, if 'No', please explain.

Given the program's class sizes and cohorts as well as its program-level learning outcomes:

- Does the faculty have the recent research or professional/clinical expertise needed to sustain the program, promote innovation and foster an appropriate intellectual climate? *YES*
- Where appropriate, is financial assistance to students sufficient to ensure adequate quality and numbers of students? *YES*
- Are supervisory loads adequately distributed, given the qualifications and appointment status of the faculty? YES

2.8 Quality and other indicators (QAF 5.1.3.1.8)

Please comment on:

- Quality of the faculty (e.g., qualifications, funding, honours, awards, research, innovation and scholarly record, appropriateness of collective faculty expertise to contribute substantively to the program and commitment to student mentoring).

  NOTE: Please avoid using references to individuals. Instead, aim to assess the ability of the faculty as a whole to deliver the program and focus on the areas of the program(s) that the university has chosen to emphasize, in view of the expertise and scholarly productivity of the faculty.

- Any other evidence that the program and faculty ensure the intellectual quality of the student experience.

- *It would be too lengthy to go over each faculty members' qualifications and research record, even in the abstract and without naming anyone. The director and core faculty members (i.e., those teaching the five required core courses: FCIT 600, 601, 602, 603; FCIT 620) are highly qualified, active in research and/or in a professional capacity, and have the knowledge, qualifications, experience, and enthusiasm to drive the program. Faculty members in charge of electives are also eminently qualified. We therefore have no doubt that, from an academic and research perspective, the faculty complement is well suited to teach such a program.*

- *Two new faculty members (this includes the instructor mentioned above) have been recruited, whose work is directly related to future studies and to approaching cities as systems. The other core faculty members we have spoken to have thoughtfully prepared new courses which integrate systems and futures thinking into their more topic-oriented courses. In all cases these instructors are involved in research that is relevant to cities and/or to the systems and futures approaches. Overall, the faculty instructors are very enthusiastic about this new program.*

- *All classes will be taught by faculty members.*

- *The size of the four core courses (FCIT 600 to FCIT 603) will be directly dependent upon the size of the cohort. The size of FCIT 620 will depend on how many of the cohort can take an international field trip. The size of the electives will depend upon how many students choose each course. This means that some electives may have many students, and others fewer. However, the quality of the program depends on all these electives being available – some topics may be less popular, yet it is not their popularity that determines their academic or professional relevance. This is why we think that serious consideration should be given to opening electives to a wider student body. As we understand it, these electives do not require advanced systems or futures thinking (which will have been covered in the core courses) and could be of interest to a wider variety of graduate students.*

- *Since courses will essentially be given on-line, the physical size of classrooms is less of an issue. Still, classes should remain small enough in terms of student numbers for dynamic interactions to be possible between instructors and students.*

3. ADDITIONAL INSIGHTS

Please comment on:

- Include any additional assessment of the New Program Proposal as a whole, as appropriate.

- Any other issues/comments, as applicable.

  • *All reviewer insights and comments can be found elsewhere in the document*

4. SUMMARY AND RECOMMENDATIONS

Provide a brief summary of the review. Please include commentary on any clearly innovative aspects of the proposed program together with recommendations on any essential or otherwise desirable modifications to it, as applicable.

Recommendations that are clear, concise, and actionable are the most helpful. Please include specific steps to be taken on any essential or otherwise desirable modifications to the proposed program.

The proposed master of Future Cities Program is an innovative program which fills a gap in the Canadian market, where future studies programs are rare, particularly with respect to cities. The participating faculty are highly qualified, engaged, and excited about the program. The proposed curriculum is academically rigorous, offering students the opportunity to master the theory and concepts needed to understand how cities work as, and as part of, complex systems. As the program is largely online, it removes some of the barriers that may keep students from undertaking a degree. This innovative program will appeal to early-career and mid-career professionals for whom it is hard to attend courses in person on Waterloo's campus, full time. The program's structure and the requirements to meet program objectives and program-level learning outcomes are well-conceived and appropriate. The program requirements are appropriate and in line with the University's graduate level degree expectations.

Since we are evaluating a proposed program, we prefer to cast our conclusions and 'recommendations' as suggestions and as items to think about. Certain items such as finding a way to curate admissions, ensuring adequate dedicated support staff, and ensuring that the director has sufficient time to deal with all the unexpected issues that are sure to arise over the first few years of a new program, are of high priority. We also think that market research – both now (if possible) but certainly as the program begins and tries to find its position – could be very important.

High priority suggestions

1. Given that the program will not benefit from the administrative staff and procedures of a department, it is important to ensure that sufficient dedicated staff are available to deal with student affairs and with other aspects of program administration.

2. This is a new program, which will require constant monitoring and oversight for its first few years. Professor Minaker's course release, which we understand reduces her teaching load to 3 courses per year, is probably not sufficient. Additional teaching release is recommended in the first few years of this new program, so that the director can play a key role in the successful launch, monitoring, tweaking, marketing, and growth of the program.

3. It is important to market this program correctly. This probably entails market research before its launch, and certainly on-going market research to ensure that the university knows where to promote the program, and to ensure that potential students who may be interested in the

program are made aware of it. We feel (but do not have the market research to back up this feeling!) that, given its essentially on-line structure, this program could be of interest to international as well as to domestic students.

4. The program is interdisciplinary and will be admitting mid-career professionals. Admissions will therefore need to be curated (to try to ensure a diversity of backgrounds and skills within each student cohort, as well as general EDI issues at Waterloo). Also, thought will need to be given as to how to assess candidates with good professional credentials and accomplishments but maybe weaker (and ancient) academic records.

Other suggestions

5. The program is located within the Faculty of the Environment. Whilst we understand that this has been done before with success, we wonder whether it would not benefit from the administrative services, as well as the advocacy of a department director, of a department (such as Planning or Knowledge Integration).

6. Currently, most faculty teaching in the program come from departments within the Faculty of the Environment. Whilst agreements in principle exist that release them from some departmental duties in order to teach in the program, such agreements can be difficult to respect over the longer term as each department's needs and priorities change. It will be important to ensure that these agreements are respected, and to put in place a mechanism whereby due notice is given by a department and/or a professor who is expecting to withdraw from the program, so that replacements may be found in a timely fashion.

7. The library is well equipped to deal with remote students. A curated collection of material dealing with systems theory and future studies (especially as they relate to cities) would be useful as support for the program. The only question we have relates to international students having access to material that is only available in hard-copy (such as foundational literature; grey literature; printed reports) which cannot be accessed via the university library network nor using the Canada Post arrangement.

8. A considerable number of elective courses have been developed for the program. Whilst the core courses, which are taken by the whole cohort, will understandably be dedicated to the program, it may be useful to open the electives to the wider Waterloo community. Indeed, all the electives are interesting, and students need to have access to them; however, some may attract fewer students than others from within the Future Cities program. Therefore, opening them up will (maybe with reserved places for Future Cities students) would ensure these courses can be given regularly.

Signature: Richard Shearmur **Date:** 28th Sept. 2022

Signature: Jason Gilliland **Date:** 28th Sept. 2022

APPENDIX A

Academic Program Review Site Visit
September 19 – 23, 2022

Site Visit Team

Professor Richard Shearmur, McGill University, Quebec
Professor Jason Gilliland, University of Western Ontario, Ontario
Internal Support Person: Professor Cora Cluett, University of Waterloo, Fine Arts

Monday, September 19, 2022

1:00 – 1:45 p.m.	Introductory Meeting with Jeff Casello, Associate Vice-President, Graduate Studies and Postdoctoral Affairs; Amanda McKenzie, Director, Quality Assurance (Academic Programs); Johanna Wandel, Associate Dean Undergraduate Studies, (Acting for Bruce Frayne, Dean of Environment); Leia Minaker, incoming Program Director
1:45 – 2:00 p.m.	Break
2:00 – 2:45 p.m.	Meeting with: Jean Andrey, former Dean of Environment
2:45 – 3:00 p.m.	Break
3:00 – 3:30 p.m.	Meeting with Peter Deadman, Associate Dean Graduate Studies
3:30 – 3:45 p.m.	Break
3:45 – 4:30 p.m.	Meeting with: Johanna Wandel, former Associate Dean, Strategic Initiatives
4:30 – 5:00 p.m.	Time for site visit team to debrief

Wednesday, September 21, 2022

1:00 – 1:30 p.m.	Meeting with: Leia Minaker (School of Planning), incoming program director Clarence Woudsma (School of Planning), Acting Program Director during proposal development
1:30 – 1:45 p.m.	Break
1:45 – 2:45 p.m.	Meeting with core MFC faculty (futures space): Helen Kerr, Lecturer (Faculty of Environment) Marta Berbes, Assistant Professor (Faculty of Environment/School of Planning)
2:45 – 3:00 p.m.	Break
3:00 – 3:45 p.m.	Meeting with core faculty, required MFC courses: Cameron McCordic (Assistant Professor, School of Enterprise, Environment and Development) Pierre Filion (Professor Emeritus, School of Planning)
3:45 – 4:00 p.m.	Break
4:00 – 4:30 p.m.	Meeting with program faculty, MFC electives: Simron Singh (Professor, School of Enterprise, Environment and Development) John McLevey (Associate Professor, Knowledge Integration) Sarah Burch (Associate Professor, Geography and Environmental Management/Executive Director, Waterloo Climate Institute) Nancy Worth (Associate Professor, Geography and Environmental Management) Dan Cockayne (Associate Professor, Geography and Environmental Management) Maya Przybylski (tentative, Interim Director, School of Architecture)
4:30 – 5:00 p.m.	Time for site visit team to debrief

Thursday, September 22, 2022

9:45 – 10:15 a.m.	Meeting with: Nancy Collins, Head, Information Services and Resources, Dana Porter Library Marian Davies, Subject Librarian, Planning
10:15 – 11:00 a.m.	Break
11:00 – 12 noon	Time set aside for a potential follow-up with Jean Andrey, if necessary.
12 – 12:30 p.m.	Time for site visit team to debrief

Friday, September 23, 2022

9:30 – 10:00 a.m.	Meeting with Dr. James Rush, Vice-President, Academic and Provost
10:15 – 10:45 a.m.	Meeting with Bruce Frayne, Dean of Environment
10:45 – 11:15 a.m.	Time for site visit team to debrief
11:15 – 11:30 a.m.	Wrap-up meeting with Leia Minaker, in-coming Program Director and Clarence Woudsma, acting Program Director during proposal development
11:30 – 12 noon	Exit Meeting with Jeff Casello, Associate Vice-President, Graduate Studies and Postdoctoral Affairs, and Angela Christelis, Coordinator, Quality Assurance

Program Response to External Reviewers' Report **Master of Future Cities (MFC) October 2022**

General Commentary
We would like to thank Drs. Shearmur and Gilliland for their feedback and suggestions. Below we describe how each of their suggestions will be addressed to strengthen the program and ensure its success.

Program Response to External Reviewers' Recommendations
The reviewers stated that they prefer to list suggestions as items for consideration rather than recommendations. Below are a set of high priority suggestions as well as other suggestions.

High Priority Suggestions:

1. Given that the program will not benefit from the administrative staff and procedures of a department, it is important to ensure that sufficient dedicated staff are available to deal with student affairs and with other aspects of program administration.

Response
Thank you for this feedback. You have correctly identified some of the challenges of a Faculty-level (rather than department-level) graduate program. While we are prepared to offer this program to incoming students in Fall 2023 at the Faculty level (as we have successfully done with other programs in the past), our Dean has begun discussions to explore the MFC's fit within the Faculty's Knowledge Integration (KI) department or School of Planning. We agree that situating the program within a department would provide the dedicated staff support and additional program administration support required for the program's long-term success. The School of Planning may be a good fit given the program's focus on cities, while the interdisciplinary and futures orientation of MFC fits well with the interdisciplinary, problem-based pedagogy in KI. We will continue to work collaboratively with the Directors/Chairs of Planning and KI, the Dean as we explore the options for a future unit for the program.

2. This is a new program, which will require constant monitoring and oversight for its first few years. Professor Minaker's course release, which we understand reduces her teaching load to 3 courses per year, is probably not sufficient. Additional teaching release is recommended in the first few years of this new program, so that the director can play a key role in the successful launch, monitoring, tweaking, marketing, and growth of the program.

Response

The Program Director's current course release is currently one course release every other year, bringing her course load to 3 each year. We agree with the recommendation to increase this and will therefore implement a full course release each year, resulting in a 2/3 teaching load over a two-year cycle.

3. It is important to market this program correctly. This probably entails market research before its launch, and certainly on-going market research to ensure that the university knows where to promote the program, and to ensure that potential students who may be interested in the program are made aware of it. We feel (but do not have the market research to back up this feeling!) that, given its essentially on-line structure, this program could be of interest to international as well as to domestic students.

Response

Thank you for this comment. An initial draft of the MFC graduate marketing recruitment plan was completed by the Faculty's Marketing and Recruitment Specialist in March 2022. The unique hybrid format and flexible completion timelines of the program were anticipated to be attractive to early- and mid-career professionals. The plan includes a series of actions to support recruitment over the first years of the program. Specific elements of the initial recruitment plan include: a Future Cities Video Series, a series of short, informative videos aimed at answering frequently asked questions about the program; a Future Cities Seminar Series (planning for which is currently underway); News stories posted on the Faculty's webpages as well as on the University's podcast and Daily Bulletin, and; the creation of a website, mailing list, and creating a MFC Google AdWords campaign. In the subsequent recruitment plan, we will: add additional web content to the website (after the program receives final approvals); create a digital brochure aligned with the Faculty's current graduate programs; host a graduate program open house, and; host an information webinar to extend our prospective student reach. We anticipate that future students and alumni of the program will be an important source of recruitment and thus have also created a student and alumni engagement plan, which will adapt to future circumstances and needs.

Regarding international student recruitments, we expect that most applicants will be domestic students, but are certainly open to accepting international students.

4. The program is interdisciplinary and will be admitting mid-career professionals. Admissions will therefore need to be curated (to try to ensure a diversity of backgrounds and skills within each student cohort, as well as general EDI issues at Waterloo). Also, thought will need to be given as to how to assess candidates with good professional credentials and accomplishments but maybe weaker (and ancient) academic records.

Response

University of Waterloo has several non-standard admissions pathways for graduate students. In the ramp-up phase of the program, we expect to admit all qualified students until we hit our target number, and we will additionally consider non-standard admissions on the basis of professional and lived experiences on a case-by-case basis.

We anticipate that the balance of disciplines will vary from cohort to cohort, and so each cohort will have its own composition and resulting character. Because there are no specific undergraduate disciplinary pathways to this degree and because our marketing strategy (see Response to Suggestion 3) will aim to recruit students from diverse fields/disciplines, we expect to recruit cohorts with diverse disciplinary backgrounds. Even if we are unsuccessful in recruiting an evenly-balanced interdisciplinary cohort in the first several years, the program itself will add diverse perspectives through faculty teaching and other program experiences (such as the seminar series, for example).

Finally, as per our response to suggestion 8, we are considering implementing a “mirror course” strategy for several of the core and elective courses (depending on student interest), wherein two sections of the same course are taught by the same instructor, with one section being the MFC cohort and the other being open to non-MFC students. This will help to maintain the cohort feel of the program but still provides access to all who wish to take the course.

Other suggestions:

5. The program is located within the Faculty of the Environment. Whilst we understand that this has been done before with success, we wonder whether it would not benefit from the administrative services, as well as the advocacy of a department director, of a department (such as Planning or Knowledge Integration).

Response

Please see response to High Priority Suggestion #1 above. We have begun conversations with relevant stakeholders within the Faculty and working towards situating the MFC program within either the School of Planning or Knowledge Integration department.

6. Currently, most faculty teaching in the program come from departments within the Faculty of the Environment. Whilst agreements in principle exist that release them from some departmental duties in order to teach in the program, such agreements can be difficult to respect over the longer term as each department's needs and priorities change. It will be important to ensure that these agreements are respected, and to put in place a mechanism whereby due notice is given by a department and/or a professor who is expecting to withdraw from the program, so that replacements may be found in a timely fashion.

Response

Thank you for this excellent suggestion. Professor Minaker will approach each of the department heads to begin discussions about establishing a mechanism by which due notice will be given in the case a department/professor expects to withdraw from the program. This will be done in conjunction with the Associate Dean of Graduate Studies.

7. The library is well equipped to deal with remote students. A curated collection of material dealing with systems theory and future studies (especially as they relate to cities) would be useful as support for the program. The only question we have relates to international students having access to material that is only available in hard-copy (such as foundational literature; grey literature; printed reports) which cannot be accessed via the university library network nor using the Canada Post arrangement.

Response

I have followed up with Marian Davies (the Faculty's library liaison) to respond to this suggestion appropriately. As you know, the University of Waterloo has an effective interlibrary loan service. All students (including international students) have access to the university library network and are able to access the network as long as they have an internet connection. However, the library liaison has assured me that in the rare circumstance that student somehow does not have access to the library network, they would find whatever alternative means necessary to provide the students with the material for their studies even if they had to work through a third party.

8. A considerable number of elective courses have been developed for the program. Whilst the core courses, which are taken by the whole cohort, will understandably be dedicated to the program, it may be useful to open the electives to the wider Waterloo community. Indeed, all the electives are interesting, and students need to have access to them; however, some may attract fewer students than others from within the Future Cities program. Therefore, opening them up will (maybe with reserved places for Future Cities students) would ensure these courses can be given regularly.

Response

We agree that many of the program electives will likely garner interest from beyond the MFC student cohort (as might some of the core courses). As noted in the response to Suggestion 4, we are considering implementing a "mirror course" strategy for several of the core and elective courses (depending on student interest), wherein two sections of the same course are taught by the same instructor, with one section being the MFC cohort and the other being open to non-MFC students. The development of these "mirror courses" could be administered in a way that does not increase the overall workload of the instructors, especially given that the courses will be online and so materials would be equivalent between courses (e.g., lecture content would not have to be recorded twice). Please note, the ultimate decision to open elective courses (and a limited number of core courses) will depend on student interest as noted. Thank you for this suggestion.

Signature of Approval

November 4, 2022

Chair/Director Date

Dean's Response to External Reviewers' Report
Master of Future Cities (MFC)
October 2022

General Commentary

Dean can add commentary here (e.g., how recommendations fit with the program and faculty's future plans, if particular recommendations are the purview of the program etc.).

Dean's Response to External Reviewers' Recommendations

The reviewers stated that they prefer to list suggestions as items for consideration rather than recommendations. Below are a set of high priority suggestions as well as other suggestions.

High Priority Suggestions:

1. Given that the program will not benefit from the administrative staff and procedures of a department, it is important to ensure that sufficient dedicated staff are available to deal with student affairs and with other aspects of program administration.

> **Dean's Response**
> The Dean's Office has created some dedicated capacity within its existing administrative structure to ensure that support is provided to the program in the initial start-up phase (~2 years). This provides the time required to assess future administrative resource needs to ensure successful implementation.

2. This is a new program, which will require constant monitoring and oversight for its first few years. Professor Minaker's course release, which we understand reduces her teaching load to 3 courses per year, is probably not sufficient. Additional teaching release is recommended in the first few years of this new program, so that the director can play a key role in the successful launch, monitoring, tweaking, marketing, and growth of the program.

> **Dean's Response**
> Agreed and an additional course release will be provided to the Director.

3. It is important to market this program correctly. This probably entails market research before its launch, and certainly on-going market research to ensure that the university knows where to promote the program, and to ensure that potential students who may be interested in the External Reviewers' Report for Cyclical Program Reviews Page 10 of 12 program are made aware of it. We feel (but do not have the market research to back up this feeling!) that, given its essentially on-line structure, this program could be of interest to international as well as to domestic students.

Dean's Response
There is a workplan in place, flowing from the Faculty's Marketing and Recruitment Specialist (completed in March 2022) that addresses this recommendation (see Program Director's response for detail).

4. The program is interdisciplinary and will be admitting mid-career professionals. Admissions will therefore need to be curated (to try to ensure a diversity of backgrounds and skills within each student cohort, as well as general EDI issues at Waterloo). Also, thought will need to be given as to how to assess candidates with good professional credentials and accomplishments but maybe weaker (and ancient) academic records.

Dean's Response
This issue is important and UW has non-standard admissions pathways to assist in this regard. In addition, our professional Master of Environment and Business provides precedence on the question of evaluating experience and academic credentials of applicants, within the framework of EDI.

Other suggestions:

5. The program is located within the Faculty of the Environment. Whilst we understand that this has been done before with success, we wonder whether it would not benefit from the administrative services, as well as the advocacy of a department director, of a department (such as Planning or Knowledge Integration).

Dean's Response
After consultations with both Planning and KI, as well as other relevant stakeholders, on balance I have decided that the program should remain at the Faculty level for the initial start-up. This will provide time to evaluate the implementation challenges and opportunities of the program and allow a more fulsome exploration of the most suitable

departmental home unit for the program. I note that this does not exclude the program remaining at the Faculty level in the longer term.

6. Currently, most faculty teaching in the program come from departments within the Faculty of the Environment. Whilst agreements in principle exist that release them from some departmental duties in order to teach in the program, such agreements can be difficult to respect over the longer term as each department's needs and priorities change. It will be important to ensure that these agreements are respected, and to put in place a mechanism whereby due notice is given by a department and/or a professor who is expecting to withdraw from the program, so that replacements may be found in a timely fashion.

Dean's Response
Agreed and this falls under the responsibilities of the Director and Associate Dean Graduate Studies.

7. The library is well equipped to deal with remote students. A curated collection of material dealing with systems theory and future studies (especially as they relate to cities) would be useful as support for the program. The only question we have relates to international students having access to material that is only available in hard-copy (such as foundational literature; grey literature; printed reports) which cannot be accessed via the university library network nor using the Canada Post arrangement.

Dean's Response
The Director has followed up with the Faculty's library liaison, who is aware of the program and ready to provide assistance and resources as required by all students.

8. A considerable number of elective courses have been developed for the program. Whilst the core courses, which are taken by the whole cohort, will understandably be dedicated to the program, it may be useful to open the electives to the wider Waterloo community. Indeed, all the electives are interesting, and students need to have access to them; however, some may attract fewer students than others from within the Future Cities program. Therefore, opening them up will (maybe with reserved places for Future Cities students) would ensure these courses can be given regularly.

Dean's Response
One intention of the program is to draw interest from beyond only the Faculty of Environment; in this context, course delivery will be planned based on demand.

Recommendations Not Selected for Implementation

None, with the note that #5 will remain under consideration in the evolving context of the program's implementation.

Signature of Approval

4 November 2022

Faculty Dean Date

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

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

To: Senate Graduate & Research Council
Senate Undergraduate Council

From: Secretariat

Date: 3 February 2023

Re: Potential amendments to the annual meeting schedule of Senate

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For consideration:

In response to the Senate Governance Review, the Secretariat is exploring potential changes to the annual schedule of regular Senate meetings.

Upon examination, it appears that the normal number of general Senate meetings may be feasibly reduced from ten (10) meetings annually to eight (8) annually, with meetings approximately evenly spaced as follows: five (5) regular meetings of Senate between 1 January and 30 June and three (3) regular meetings of Senate between 1 September and 30 November. This recognizes the general pattern of cancelling the regular December Senate meeting as well as the possibility of condensing regular Senate meetings in the January-June period. A revised Senate meeting schedule would aim to complete the same amount of regular business annually with fewer regular meetings (example provided):

1. Mid-May
2. Late June
3. Late September
4. Late October
5. Late November
6. Late January
7. Early March
8. Mid-April

NB: academic year beginning 1 May

In considering these potential changes we are mindful that the revised schedule needs to be feasible for Senates councils to complete the large volume of work that comes through these bodies. It is particularly important to keep Senate meetings in months that are key for each Senate council (November/March/May for SUC per the effective dates chart, November/April/June for SGRC per the GSPA office).

REQUEST: This is to seek the feedback of Senate's councils on the potential amendments to the Senate meeting schedule, in consideration of the factors noted in this memo and any other germane to the matter.

UNIVERSITY OF WATERLOO
FACULTY OF ENGINEERING

M E M O

TO: Kathy Winter, Assistant University Secretary & Privacy Officer Secretariat

FROM: S. Sivoththaman, Associate Dean, Graduate Studies, Faculty of Engineering

RE: Senate Graduate and Research Council

DATE: January 30, 2023

Please place the following motions forward for approval at the next meeting of the SGRC. These changes were approved by the EFC on January 17, 2023.

Items for Approval:

1. The department of Electrical and Computer Engineering would like to make the following calendar changes:

    a. ECE PhD Admissions Average Requirements Update
    b. Revision to course ECE 649

Rationale for Request:

a. The 80% minimum is a better reflection of the reality of PhD admissions in ECE and coincides with the admission averages for most of the Engineering departments in the Faculty of Engineering. This change may also encourage more applicants to apply, as 80% could be more attainable than 83%. Historical grade data in ECE shows that non-standard admits with entrance averages below 83% have performed almost as well as standard admits in the program.
b. This course is currently labeled as a "LEC" meet type, but should be a "PRJ" meet type, similar to ECE 699.

2. The department of **Chemical Engineering** would like to make the following calendar changes:

These items for consideration on SGRC Regular Agenda

a. Adding new course CHE 650
b. Adding new course CHE 651
c. Adding a direct entry MEng co-op program
d. A new MEng specialization- Entrepreneurship
e. PhD Program changes

i. Adding a PhD Advisory Committee Meeting and Report milestone to the degree requirements
ii. Updating the PhD Comprehensive Examination description and requirements

Rationale for Request:

a. This course is a key component of the CHE MEng co-op program which is in line with the departmental, Faculty, and University Work Integrated Learning (WIL) goals.
b. This course is a key component of the CHE MEng Entrepreneurship specialization which is both aligned with the long-term vision of the Department of Chemical Engineering, the Conrad School of Entrepreneurship and Business, and the University.

These items for consideration on SGRC Regular Agenda

c. The MEng in Chemical Engineering Co-op program is in line with the departmental, Faculty, and WIL goals. It will be a competitive program and is in line with recommendations of an external review from 2017 as well as feedback from past MEng students.
d. This is in line with the long-term vision of the department of Chemical Engineering, the Conrad School of Entrepreneurship and Business, and the University. The majority of past MEng students have taken 2-3 BE courses and have provided positive feedback to the department regarding their utility and the additional breadth in the training. Providing formal curriculum which focuses on the entrepreneurship leverages MEng student interest focuses it on a strategic area which needs to be enhanced in the discipline, entrepreneurship.
e. i) The PhD Advisory Committee Meeting and Report will provide increased support to students and their supervisors. Performance feedback will be provided to students prior to the PhD comprehensive examination for direct admit students and between the PhD comprehensive examination and defence for direct and standard admit students. Formal feedback will be provided from faculty other than the supervisor(s)
ii) To be consistent with the University and Faculty of Engineering-level PhD Comprehensive Examination minimum requirements.

3. The department of **Systems Design Engineering** would like to make the following calendar changes:

a. Adding new course SYDE 663 which will be cross listed with ENGL 701
b. Expand the elective course list to include courses from the Faculties of Engineering, Mathematics, Health, Environment, and Science for:
    i. MASc and MASc- Aero
    ii. PhD and PhD- Aero
c. Update seminar requirements for:
    i. MASc, MASc- Nano, MASc- Aero
    ii. PhD, PhD- Nano, and PhD- Aero
d. Update seminar attendance requirements for:
    i. MASc, MASc- Nano, MASc- Aero
    ii. PhD, PhD- Nano, and PhD- Aero
e. Revise Length of program information for MASc, MASc- Nano, and MASc- Aero

UNIVERSITY OF WATERLOO

Graduate Studies Program Revision Template

This item is for consideration on SGRC Regular Agenda

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: Engineering

Program: Master of Engineering (MEng) in Chemical Engineering - Co-operative Program

Program contact name(s): Nasser Mohieddin Abukhdeir, Judy Caron

Form completed by: Nasser Mohieddin Abukhdeir

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

Adding a direct entry Co-operative program/option to the MEng in Chemical Engineering program.

Is this a major modification to the program? Yes

Rationale for change(s):

The MEng in Chemical Engineering Co-op program is in line with departmental, Faculty, and University Work Integrated Learning (WIL) goals. It is proposed to be highly competitive, selective, and with capacity constraints to minimize effects on the undergraduate co-op program. Program capacity, limited to <10 students initially, would be based both on the performance of past MEng Co-op cohorts and that of our undergraduate co-op program. It would be "fail safe", where students who fail to find co-op positions may transfer into the regular MEng program.

The 2017 external review of the Chemical Engineering graduate programs included the following recommendation: "The Department consider if there might be opportunities to build on their excellent reputation of co-op at the undergraduate level and see how it might be used to define a unique strength in any one or more of their three graduate degree programs." Which resulted from direct consultation with graduate students. The proposed MEng Co-op program will address this external reviewer recommendation and consistent feedback from past MEng students regarding the desire for WIL within the program.

The co-op program/option will be supported by Co-operative Education. Attached is the Feasibility Report that was completed by Co-operative Education.

Note: a separate proposal to add a new Graduate Specialization in Entrepreneurship to the MEng in Chemical Engineering program is also moving through the approval process. If/when approved, the Graduate Specialization in Entrepreneurship will also be applied to the MEng in Chemical Engineering – Co-op program.

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-chemical-engineering

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:

MASTER OF ENGINEERING (MENG) IN CHEMICAL ENGINEERING
 	
Graduate specializations
 	
• Biological Engineering
• Polymer Science and Engineering
• Process Systems Engineering
 	
Program information
 	
• **Admit term(s)**
  ○ Fall
 	
• **Delivery mode**
  ○ On-campus
 	
• **Length of program**
  ○ Full-time: 4 terms (16 months)
  ○ Part-time: 8 terms (32 months)
 	
• **Program type**
  ○ Master's
  ○ Professional
 	
• **Registration option(s)**
  ○ Full-time
  ○ Part-time
 	
• **Study option(s)**
  ○ Coursework
 	
• **Additional program information**
  ○ 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.
 	
Admission requirements
 	
• **Minimum requirements**
  ○ A 75% overall standing in the last two years, or equivalent, in a four-year Honours Bachelor's degree or equivalent.
 	
• **Application materials**
	MASTER OF ENGINEERING (MENG) IN CHEMICAL ENGINEERING - CO-OPERATIVE PROGRAM
	
	Graduate specializations
	
	• Biological Engineering
	• Polymer Science and Engineering
	• Process Systems Engineering
	
	Program information
	
	• Admit term(s)
	  ○ Fall
	
	• **Delivery mode**
	  ○ On-campus
	
	• **Length of program**
	  ○ Full-time: 5-6 terms (20-24 months)
	
	• **Program type**
	  ○ Co-operative
	  ○ Master's
	  ○ Professional
	
	• **Registration option(s)**
	  ○ Full-time
	  ○ Part-time
	
	• **Study option(s)**
	  ○ Coursework
	
	• **Additional program information**
	  ○ 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.
	
	Admission requirements
	
	• **Minimum requirements**
	  ○ A 75% overall standing in the last two years, or equivalent, in a four-year Honours Bachelor's degree or

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:
○ Résumé ○ Supplementary information form ○ Transcript(s) • **References** ○ Number of references: 2 ○ Type of references: at least 1 academic • **English language proficiency (ELP)** (if applicable) **Degree requirements** • **Graduate Academic Integrity Module (Graduate AIM)** • **Courses** ○ 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: ▪ 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: ▪ Minimum cumulative average of 70%. ▪ Minimum grade of 65% in each individual course.	equivalent. • **Application materials** ○ Résumé ○ Supplementary information form ○ Transcript(s) • **References** ○ Number of references: 2 ○ Type of references: at least 1 academic • **English language proficiency (ELP)** (if applicable) **Degree requirements** <u>The MEng in Chemical Engineering - Co-operative Program will enable students to combine graduate studies with work experience.</u> <u>The program includes completion of 1-2 required work terms. The work term(s) typically takes place in term 4 (or terms 4 and 5). The work term(s) must meet CEE standard work term requirements and Departmental requirements. Student's should apply to jobs related to their program of study.. Note: the program must start and end on an academic term. Students in the program are encouraged to complete COOP 601 Career Success Strategies in the academic term prior to the first work term.</u> • **Graduate Academic Integrity Module (Graduate AIM)** • **Courses** ○ Students must complete CHE 600 Engineering and Research Methods, Ethics, Practice, and Law (0.25 credit weight), <u>CHE 650 Engineering Work-term Experience Report (0.25 credit weight, must be completed in term 5 or 6)</u> and 8 graduate courses (0.50 unit weight per course) as follows: ▪ CHE 601 Theory and Application of Transport Phenomena ▪ CHE 602 Chemical Reactor Analysis ▪ 6 graduate level electives of which 3 must be CHE courses

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:
▪ 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: 1. Biological Engineering 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 Specialization on their transcript if they have completed the requirements associated with the MEng degree and the requirements associated with the Graduate Specialization. ○ 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. 1. Graduate Specialization in Biological Engineering	○ 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: ▪ 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: 1. Biological Engineering 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 Specialization on their transcript if they have completed the requirements associated with the MEng degree and

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:
○ To receive the Graduate Specialization in Biological Engineering, students must successfully complete 3 compulsory courses and 1 elective course: ▪ Compulsory courses: ▪ CHE 562 Advanced Bioprocess Engineering ▪ CHE 660 Principles of Biochemical Engineering ▪ CHE 663 Bioseparations ▪ Elective courses (choose 1 from the following list): ▪ CHE 561 Biomaterials & Biomedical Design ▪ CHE 564 Food ProcessEngineering 2. Graduate Specialization in Polymer Science and Engineering ○ To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 541 Introduction to Polymer Science and Properties ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 543 Polymer Production: Polymer Reaction Engineering ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations 3. Graduate Specialization in Process Systems Engineering ○ To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2	the requirements associated with the Graduate Specialization. ○ 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. 1. Graduate Specialization in Biological Engineering ○ To receive the Graduate Specialization in Biological Engineering, students must successfully complete 3 compulsory courses and 1 elective course: ▪ Compulsory courses: ▪ CHE 562 Advanced Bioprocess Engineering ▪ CHE 660 Principles of Biochemical Engineering ▪ CHE 663 Bioseparations ▪ Elective courses (choose 1 from the following list): ▪ CHE 561 Biomaterials & Biomedical Design ▪ CHE 564 Food ProcessEngineering 2. Graduate Specialization in Polymer Science and Engineering ○ To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 541 Introduction to Polymer Science and Properties

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:
compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 520 Process Flowsheet Analysis ▪ CHE 521 Process Optimization ▪ CHE 522 Advanced Process Dynamics and Control • **Seminar Attendance** ○ 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.	▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 543 Polymer Production: Polymer Reaction Engineering ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations 3. Graduate Specialization in Process Systems Engineering ○ To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 520 Process Flowsheet Analysis ▪ CHE 521 Process Optimization ▪ CHE 522 Advanced Process Dynamics and Control • **Seminar Attendance** ○ 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.

Current MEng in Chemical Engineering Graduate Studies Academic Calendar content:	Proposed MEng in Chemical Engineering – Co-operative Program Graduate Studies Academic Calendar content:

	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.
	
	• **Graduate Studies Work Report**
	  ○ Students must complete one or two work-term experience(s). A work report must be submitted to the Department for review and credit by the end of each work term.
	  ○ Students are responsible for following the roles and responsibilities of Co-operative and Experiential Education (CEE).

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

Students currently registered in the program will not have access to this program in that it is admit-only and will be unaffected.

Department/School approval date (mm/dd/yy): 09/12/2022
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/15/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

CO-OPERATIVE AND EXPERIENTIAL EDUCATION
Co-operative Education
519-888-4026 | ceehub@uwaterloo.ca

Co-operative & Experiential Education (CEE)

Preliminary review

Proposed Program: Master of Engineering, Chemical Engineering, Co-operative Education

Program Effective Date: Fall 2023

Requested by: Nassar Mohieddin Abukhdeir, Associate Chair, Chemical Engineering

Prepared by: Richard Wikkerink, Director, Student & Faculty Relations, Co-operative Education

Executive Summary

The Department of Chemical Engineering has expressed intent to add a program-level work integrated learning (WIL) experience (co-op) option to their master's program for fall 2023. The co-op components of the degree will be fully administered by Co-operative & Experiential Education (CEE) with the work integrated learning (WIL) component included as a milestone degree requirement.

CEE will utilize existing staff, resources, and co-op processes across the portfolio, to support this new program, as it does for other graduate co-op programs in Engineering. CEE will require sufficient time to complete a new program plan and will work with the program in the coming months to address system and records processing needs, WIL programming and job development opportunities.

An industry and jobs analysis is not included in this report as there was insufficient advanced notice. Analysis, completed by CEE, will follow in 2023 and encompass all existing, new, and anticipated graduate co-op plans in the Faculty of Engineering.

With the understanding of a cap of 5 students for fall 2023, CEE supports in principle the proposed new MEng Chemical Engineering Co-op program and will collaborate with the academic unit on the development and administration of co-op components of the degree.

CEE recommends the Department of Chemical Engineering (Graduate Studies) consider the following:

- Establish new co-op admission requirements for Fall 2023 so that students may be directly admitted to the program, reducing barriers for international students who are required to obtain a co-op work permit to work in Canada

- Include co-op degree requirements in graduate calendar
- Review the implications of involvement in co-op as related to items such as, but not limited to, student statuses, funding packages and scholarships.

CEE, with leadership from the designated Faculty Relations Manager, will:

- Complete a labor market and co-op job analysis for MEng programs, sharing this data with the grad job development working group to inform Account Management (AM) and Business Development (BD) activities and targets. The Senior Advisor working with Engineering and Mitacs is included in this group
- Collaborate with the Associate Chair Graduate Studies for Chemical Engineering and the Graduate Officer/Coordinator to work through the Co-op Program Plan

Work-Integrated Learning at UW

Co-operative Education is a form of work integrated learning (WIL), which allows students to apply classroom learning to the workplace and, likewise, connect workplace learning to their degree and areas of specialization. For those students who are seeking a stronger connection between their studies and industry, the University of Waterloo's co-op programs distinguish it amongst Canadian institutions. Furthermore, CEE provides a robust system of support for students (domestic and international visa) seeking work experiences in Canada or internationally.

Benefits go beyond the students. Industry partners benefit by gaining access to a wider range of grad students who bring varied experiences personally, professionally, and academically. All stakeholders will benefit from opportunities for idea exchange and strengthened connection between academic research and innovations in industry.

Introducing a new co-op plan aligns with the strategic focus on GradWIL at an institutional level and will continue to reinforce UW as a WIL leader for both undergraduate and graduate programs.

The key components of a quality WIL experience are pedagogy, experience, assessment and reflection, or P.E.A.R. Making sure all four elements are included in the development of program-level WIL are critical for creating a qualify WIL experience.

- Pedagogy – includes the academic course content and the WIL curriculum
- Experience – meaningful and aligned appropriately with the WIL model
- Assessment – including the learning outcomes for the program + Future Ready Talent Framework
- Reflection – on the WIL experience and in alignment with the idea of "purposeful work"

Co-op Program Structure

The MEng Chemical Engineering Co-op program, as with other graduate co-op programs, will follow the existing co-op model. All co-op students are responsible for following the procedures, roles and responsibilities of co-op students.

Co-op students are strongly encouraged to complete PD 601 prior to their first co-op work term (typically completed in their Winter term/second study term) prior to the co-op experience and while they apply to jobs concurrently. PD 601 provides information on navigating the co-op employment process, foundational career preparation and teaches students how to prepare professional job search documents. Some graduate programs have positioned PD 601 as a foundational requirement for co-op participation. Students who have already completed similar UW co-op preparation modules (e.g.: PD1 Career

Fundamentals) will not be required to take PD 601. Note: PD 601 is currently going through a major re-development of course content, with an expected launch of Winter 2024.

The Centre for Career Action (CCA) provides career and co-op preparation resources and services (e.g.: resume, cover letter, interview preparation, job search, etc.) for all graduate students. These services are accessed more readily when promoted by the academic program or incorporated into existing courses. Additional collaboration between Chemical Engineering, SFR and CCA may be required prior to Fall 2023 to establish how existing services and staff will be utilized.

Co-op work terms must meet standard work term requirements for all graduate students. Chemical Engineering students will have access to the co-op job board through WaterlooWorks or may arrange their own employment, externally, which must be approved by CEE. During the experience, graduate students will be supported by Co-op Advisors through site visits, e-check-ins, work term ratings. Employers will evaluate the work performance of students via the Student Performance Evaluation (SPE); a rating of 'satisfactory' or above will grant the student credit for the work term.

As a best practice, it is recommended students in Graduate Co-op plan return for a final study term following the co-op work experience. The program will facilitate a work report or reflection assignment post-experience, which will also be a co-op degree milestone.

To evaluate program effectiveness and WIL outcomes, the CEE Faculty Relations Manager, Engineering, will monitor key metrics annually to ensure program quality.

Co-op Sequence

Students in MEng Chemical Engineering will be required to complete one standard co-op work term; however, CEE strongly recommends that the program allow for two consecutive co-op work terms in their program structure. Strategically, this proposed sequence would provide a longer immersive work experience for students, which is particularly appealing to industry partners, and would be consistent with other UW graduate co-op plans.

The proposed program will have students scheduled for Fall and Winter work terms, differing slightly from other graduate co-op sequences. This plan has students available to work in Winter terms, which historically have had low numbers of graduate co-op students scheduled to work.

MEng Chemical Engineering Co-op Sequence:

Fall	Winter	Spring	Fall	Winter	Spring
Study Direct-entry co-op	Study	Study Co-op prep course	**Work Term**	**Work Term**	Final course Completion of Work Report

Co-op Admissions

Programs seeking to add co-op as an option for their students, must do so by creating a direct-entry co-op program. There are a range of benefits to this structure, including CEE's ability to forecast earlier the number of students expected to be scheduled for a work term from the program and adjust employer and student-facing resources as necessary. Most notably, CEE can assist visa students in their work permit applications upon program admission, ensuring work terms are not negatively impacted by processing times.

Beginning Fall 2023, students will apply and be directly admitted into the MEng Chemical Engineering Co-op plan. The academic unit will need to establish a specific process and criteria for admissions into this new program.

Where there is demand for co-op, consideration should be given to the value and intention of a WIL experience, as academic standing is not always an indicator of workplace success. Additionally, graduate students bring a range of personal, professional, and academic experiences and so while the more experienced students may ultimately be successful in finding co-op employment, they arguably may not be the students to benefit most from the WIL experience.

Degree Requirements

Graduate students completing the co-operative education degree requirements will receive a "Co-operative Education" degree designation. These requirements include the following:

- Complete a minimum of 1 standard co-op work term and receive a Student Performance Evaluation of "marginal" or better
- Complete a work report/reflection requirement administered by the academic department

Note: as part of the GradWIL project, and in alignment with quality WIL standards, work is underway to enhance the graduate student co-op experience over the next two years. This includes the re-development of the co-op preparation course (PD 601) and the creation of a major reflective report post-experience. Graduate co-op programs

should anticipate future calendar changes including additional co-op degree requirements for their students.

Graduate Student Support

The Centre for Career Action (CCA) is in the Tatham Centre at the Waterloo campus and provides support to undergrad and grad students (whether in co-op or not), alumni and staff with co-op and career planning and preparation. Existing services include 1:1 appointments for resumes, cover letters, interview skills, work search, career planning and others, 1:1 drop-ins, workshops, both on and offline resources and supports all offered through a dedicated team of existing co-op and career staff.

Chemical Engineering graduate co-op students will be assigned to a team of Career Advisors who provide answers to co-op related questions as well as support throughout the co-op recruitment process. Once students secure a work term, they are offered additional support via a dedicated co-op Student Advisor who is available throughout the term, and provides a work term consultation and reviews e-check-ins.

Job Development

A New Program Plan will be completed between the Faculty Relations Manager, Engineering and will review the labour market, job demands, and areas for business development. With the newly established graduate job development working group in CEE, there is additional focus on strategies to develop jobs that are meaningful for the learning of graduate co-op students.

Generally, there are two years of lead time needed to develop jobs ahead of the first work term. With strong connections into associated industries, CEE can provide a range of suitable opportunities for students. As a course-based program with many pathways, marketing these students to employers may be challenging given the more specialized and focused areas of expertise and knowledge graduate students bring. Best efforts will be made to support graduate students in their job search – for example, CEE has proactively been engaged with Mitacs and the funding they have access to for WIL at the graduate level. Existing services and expertise in CCA will be leveraged to support students in their job search, noting that the new program plan will examine the resources required to provide these supports.

Note: Given the evolving landscape of graduate co-op in the Faculty of Engineering, and in anticipation of more programs coming forward to include a co-op option, CEE will complete an industry and job analysis in 2023. This report will consider all existing and new Master of Engineering co-op programs and will inform job development strategies for the growing numbers of students in these plans.

Additional Considerations
Graduate WIL

CEE and the GSPA, along with the faculties are undergoing a multi-unit, multi-year project to expand WIL offerings at the graduate level and enhance CEE co-op programming, support, and processes for graduate students. Therefore, graduate co-op will undergo several changes over the coming years which will impact existing programming, support, and job development efforts for graduate students.

Student Status and Fees

Graduate co-op students have their term status changed to co-op and pay a co-op fee during employed co-op work terms. Participation in graduate co-op may have implications for student statuses, funding packages and scholarships. The program will need to investigate further and make students aware of this.

International Students and Work Experiences

The CEE international team will support work terms held outside of Canada, adhering to UW and Global Affairs Canada (GAC) travel polices and advisories.

Students studying on a visa must obtain a co-op work permit in order to find employment for a co-op work term. Applying for a co-op work permit in Canada can take several months, with recent processing times taking at least six months. Direct admissions to the co-op program, allowing CEE to identify co-op students as early as possible, allows students to apply earlier and avoid delaying co-op employment.

Equity

Equity is an important component to consider within a competitive admissions and co-op process. For example, international students may encounter additional barriers such as: varying levels and types of work experience of incoming students, potential for travel restrictions, as well as the complexities of obtaining funding and/or security clearance that may be required for some roles can often be a disadvantage to international students and can delay or impact work term opportunities.

Co-op Program Plan

Following all levels of academic program approval for this new program and before the first term of admission, a Co-op Program Plan will be required. The Co-op Program Plan is a checklist of information, records, system, communications, etc., that ensure CEE administered co-op plans are set-up appropriately and necessary decisions are made. This is a collaborative activity led by a designated Faculty Relations Manager and the academic unit.

UNIVERSITY OF WATERLOO

Graduate Studies Program Revision Template

This item is for consideration on SGRC Regular Agenda

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: Engineering

Program: Master of Engineering (MEng) in Chemical Engineering

Program contact name(s): Nasser Mohieddin Abukhdeir, Judy Caron

Form completed by: Nasser Mohieddin Abukhdeir

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

Updating the MEng degree requirements to include one new Graduate Specialization in Entrepreneurship.

Is this a major modification to the program? Yes

Rationale for change(s):

The proposed MEng Graduate Specialization in Entrepreneurship is aligned with the long-term vision of the Department of Chemical Engineering, the Conrad School of Entrepreneurship and Business, and the University. The majority of past MEng students have chosen to take at 2-3 Business Entrepreneurship (BE) courses and have provided positive feedback to the Department regarding their utility and the additional breadth in the training. Providing a formal curriculum which focuses on entrepreneurship leverages MEng student interest and focuses it on a strategic area which needs to be enhanced in the discipline, entrepreneurship.

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-chemical-engineering/master-engineering-meng-chemical-engineering

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

Degree requirements
• **Courses**
  ○ 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:
	Degree requirements
	• **Courses**
	  ○ 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:

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
▪ 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: ▪ 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: 1. Biological Engineering 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	▪ 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: ▪ 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: 1. Biological Engineering 2. Polymer Science and Engineering 3. Process Systems Engineering <u>4. Entrepreneurship</u> ○ 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

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
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 associated with the MEng degree and the requirements associated with the Graduate Specialization. ○ 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. 1. Graduate Specialization in Biological Engineering ○ To receive the Graduate Specialization in Biological Engineering, students must successfully complete 3 compulsory courses and 1 elective course: ▪ Compulsory courses: ▪ CHE 562 Advanced Bioprocess Engineering ▪ CHE 660 Principles of Biochemical Engineering ▪ CHE 663 Bioseparations ▪ Elective courses (choose 1 from the following list): ▪ CHE 561 Biomaterials & Biomedical Design ▪ CHE 564 Food ProcessEngineering 2. Graduate Specialization in Polymer Science and Engineering ○ To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses:	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 associated with the MEng degree and the requirements associated with the Graduate Specialization. ○ 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. <u>Note: Students are limited to one Graduate Specialization designation for their MEng in Chemical Engineering degree.</u> 1. Graduate Specialization in Biological Engineering ○ To receive the Graduate Specialization in Biological Engineering, students must successfully complete 3 compulsory courses and 1 elective course: ▪ Compulsory courses: ▪ CHE 562 Advanced Bioprocess Engineering ▪ CHE 660 Principles of Biochemical Engineering ▪ CHE 663 Bioseparations ▪ Elective courses (choose 1 from the following list): ▪ CHE 561 Biomaterials & Biomedical Design ▪ CHE 564 Food ProcessEngineering 2. Graduate Specialization in Polymer Science and Engineering

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
▪ CHE 541 Introduction to Polymer Science and Properties ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 543 Polymer Production: Polymer Reaction Engineering ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations 3. Graduate Specialization in Process Systems Engineering o To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 520 Process Flowsheet Analysis ▪ CHE 521 Process Optimization ▪ CHE 522 Advanced Process Dynamics and Control	o To receive the Graduate Specialization in Polymer Science and Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 541 Introduction to Polymer Science and Properties ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 543 Polymer Production: Polymer Reaction Engineering ▪ CHE 640 Polymer Property Characterization ▪ CHE 641 Fundamentals of Polymer Processing Operations 3. Graduate Specialization in Process Systems Engineering o To receive the Graduate Specialization in Process Systems Engineering, students must successfully complete 2 compulsory courses and 2 elective courses: ▪ Compulsory courses: ▪ CHE 620 Applied Engineering Mathematics ▪ CHE 621 Model Building and Response Surface Methodology ▪ Elective courses (choose 2 from the following list): ▪ CHE 520 Process Flowsheet Analysis ▪ CHE 521 Process Optimization ▪ CHE 522 Advanced Process Dynamics and Control <u>4. Graduate Specialization in Entrepreneurship</u>

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
	○ Students must obtain approval from the Chemical Engineering Graduate Officer in order to pursue the Graduate Specialization in Entrepreneurship. Interested students will be required to submit a short proposal following matriculation describing their entrepreneurship idea and suitability to pursue it. ○ To receive the Graduate Specialization in Entrepreneurship, students must successfully complete the following 4 compulsory courses: ▪ Compulsory courses: ▪ BE 600 Management and Leadership ▪ BE 605 Project Management ▪ BE 606 Entrepreneurship and Innovation ▪ CHE 651 Technology Entrepreneurship Project

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

Current MEng students will not have access to this specialization and will be unaffected.

Department/School approval date (mm/dd/yy): 09/12/2022
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/15/22
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

From: **Admin Council (January 11, 2023)**

To: **Senate Graduate Research Council (February 13, 2023)**

Graduate calendar changes for Faculty of Health

1. PROGRAM CHANGES

1.1 School of Public Health Sciences* effective Fall 2023

1.1.1 **Motion:** Adding a Master's Thesis Proposal milestone to the degree requirements and updating the Thesis milestone description.

Rationale: MSc students must undergo a thesis proposal examination that is normally held at the end of term 3, or beginning of term 4, in the program. Students cannot go on and defend their MSc thesis until they have passed the thesis proposal examination. Currently, the thesis proposal examination is not an official milestone of the program. We are seeking to emphasize the importance of the examination by adding it as a milestone to the degree requirements.

1.1.2 **Motion:** Adding a PhD Thesis Proposal milestone to the degree requirements and updating the Thesis milestone description.

Rationale: PhD students must undergo a thesis proposal examination that is normally held at the end of term 6, or beginning of term 7, in the program. Students cannot go on and defend their PhD thesis until they have passed the thesis proposal examination. Currently, the thesis proposal examination is not an official milestone of the program. We are seeking to emphasize the importance of the examination by adding it as a milestone to the degree requirements.

1.2 Master of Social Work* effective Fall 2023

1.2.1 **Motion:** Removing the statistics requirement from the minimum admission requirements.

Rationale: The School of Social Work undertook a major review of its Master of Social Work (MSW) admissions process in 2018-19, including the MSW admissions requirements. The inclusion of a statistics course as an admission requirement was determined to be misaligned with the MSW program that mostly engages qualitative inquiries and research methodologies. While quantitative inquiries and research methodologies may be included in some course content, a course in statistics is not required in order to engage the key learning elements. The proposed change includes removing the following admission requirement: one full-course equivalent in Research Methodology and Statistics; that is, a half course in Research Methodology and a half course in Statistics, or one full course which includes both. Instead, the admission requirement will be: a half course in Research Methodology.

1.3 Kinesiology* effective Spring 2023

1.3.1 **Motion:** Updating the MKin degree requirements to include two new Graduate Specializations.

This item for consideration on SGRC Regular Agenda

Rationale: The Department of Kinesiology and Health Sciences (KHS) currently offers a wide range of courses to meet its graduate program requirements. Students within the Master of Kinesiology (MKin) course-based

program are permitted to (and typically do) bundle specific courses together with common themes. The proposed change would formalize this common practice to allow students to obtain a recognized "Graduate Specialization" when they graduate.

At UW, Graduate Specializations refer to areas of concentration related to the collective strengths of the program's faculty and staff. Based on consultations with a host of stakeholders (including students, industry and policy-related partners), there is perceived value in adding Graduate Specialization options within the MKin program to recognize a specific area of expertise on student transcripts. This will assist with recruitment of potential incoming students, and support programming decisions by the department. In addition, this recognition will enhance the marketability of graduates by signifying to employers that graduates have a specific area of expertise beyond the broad knowledge expectations of their degrees.

The proposed Graduate Specializations have been crafted such that each contributes towards the certification requirements for career-relevant regulatory bodies (e.g. Canadian College for the Certification of Professional Ergonomists, Canadian Society for Exercise Physiology, College of Kinesiologists of Ontario).

This proposal aligns with recently initiated Graduate Research Fields for thesis-based graduate students in the Department of Kinesiology and Health Sciences.

2. COURSE CHANGES

2.1 School of Public Health Sciences* effective Fall 2023

2.1.1 **Motion:** Removing HLTH 636 from the course catalogue.

Rationale: This course has not been taught for some time and is no longer needed in the Master of Public Health (MPH) curriculum. Much of the content of this course has been moved to HLTH 634. HLTH 636 may therefore be removed from the course catalog.

2.2 Master of Social Work* effective Spring 2023

2.2.1 **Motion: Removing Department consent requirement from SWK 653K.**

Rationale: In the previous course revision process, department consent was listed as being required. The course does not require department consent.

Graduate Studies
Program Revision Template

This item for consideration on SGRC Regular Agenda

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: Health

Program: Master of Kinesiology (MKin)

Program contact name(s): Andrew Laing, Alicia Nadon

Form completed by: Andrew Laing, Alicia Nadon

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

Updating the MKin degree requirements to include two new Graduate Specializations.

Is this a major modification to the program? Yes

Rationale for change(s):

The Department of Kinesiology and Health Sciences (KHS) currently offers a wide range of courses to meet its graduate program requirements. Students within the Master of Kinesiology (MKin) course-based program are permitted to (and typically do) bundle specific courses together with common themes. The proposed change would formalize this common practice to allow students to obtain a recognized "Graduate Specialization" when they graduate.

At UW, Graduate Specializations refer to areas of concentration related to the collective strengths of the program's faculty and staff. Based on consultations with a host of stakeholders (including students, industry and policy-related partners), there is perceived value in adding Graduate Specialization options within the MKin program to recognize a specific area of expertise on student transcripts. This will assist with recruitment of potential incoming students, and support programming decisions by the department. In addition, this recognition will enhance the marketability of graduates by signifying to employers that graduates have a specific area of expertise beyond the broad knowledge expectations of their degrees.

The proposed Graduate Specializations have been crafted such that each contributes towards the certification requirements for career-relevant regulatory bodies (e.g. Canadian College for the Certification of Professional Ergonomists, Canadian Society for Exercise Physiology, College of Kinesiologists of Ontario).

This proposal aligns with recently initiated Graduate Research Fields for thesis-based graduate students in the Department of Kinesiology and Health Sciences.

Proposed effective date: Term: Spring Year: 2023

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

https://uwaterloo.ca/graduate-studies-academic-calendar/applied-health-sciences/department-kinesiology-and-health-sciences/master-kinesiology-mkin

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements • **Graduate Academic Integrity Module (Graduate AIM)** • **Courses** o Completion of a minimum of 4.00 units of graduate courses (e.g., 8 courses each at a 0.50 unit weight). Of the courses, at least 0.50 units must be related to quantitative or qualitative analysis, such as research methods, modelling, mathematics, or statistics. In addition, a minimum of 2.00 units must be from the Department of Kinesiology and Health Sciences. All graduate courses must be assigned a numerical grade. Students must obtain an average of at least 75% in the set of courses which they present in fulfilment of course requirements. A grade below 70% on any individual course or an average below 75% on the set of courses for the degree will result in a review of the student's status by the Department Graduate Committee. If a student receives a grade in any individual course below 60%, the Department Graduate Committee review may result in the requirement to withdraw from the program. If the student is permitted to proceed, any course with a grade below 60% will not be eligible towards the degree requirements, thus requiring the course to be repeated or additional course work to be completed. • **Master's Seminar** o Students are required to complete a series of academic and discipline-specific seminars throughout their program of study. • **Graduate Studies Practicum** o Complete the Graduate Studies Practicum milestone.	**Graduate specializations** • Human Factors and Ergonomics (HFE) • Movement and Exercise Sciences (MES) **Degree requirements** • **Graduate Academic Integrity Module (Graduate AIM)** • **Courses** o Completion of a minimum of 4.00 units of graduate courses (e.g., 8 courses each at a 0.50 unit weight). Of the courses, at least 0.50 units must be related to quantitative or qualitative analysis, such as research methods, modelling, mathematics, or statistics. In addition, a minimum of 2.00 units must be from the Department of Kinesiology and Health Sciences. All graduate courses must be assigned a numerical grade. Students must obtain an average of at least 75% in the set of courses which they present in fulfilment of course requirements. A grade below 70% on any individual course or an average below 75% on the set of courses for the degree will result in a review of the student's status by the Department Graduate Committee. If a student receives a grade in any individual course below 60%, the Department Graduate Committee review may result in the requirement to withdraw from the program. If the student is permitted to proceed, any course with a grade below 60% will not be eligible towards the degree requirements, thus requiring the course to be repeated or additional course work to be completed. o Students in the MKin program may choose to pursue one of the following Graduate Specializations:

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
○ The practicum requirement is met with a one-term, full-time, program-relevant internship/experiential placement (minimum of 420 hours) to be arranged by the student in consultation with the Department Graduate Committee. The placement, objectives, and work required to meet these objectives are to be approved by the Department Graduate Committee and the placement supervisor. ○ Submit a discussion paper or case series related to the internship/experiential placement to the Department Graduate Committee. • **Graduate Studies Colloquium** ○ Complete the Graduate Studies Colloquium milestone. ○ Integrate the training they received through their coursework and experiential practicum, and discuss in a seminar setting how this could be applied to a health or kinesiology-related issue. • **Other requirements** ○ Meet with the Department Graduate Committee periodically to discuss course selection and program progress.	1. Human Factors and Ergonomics (HFE) 2. Movement and Exercise Sciences (MES) ○ 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 associated with the MKin degree and the requirements associated with the Graduate Specialization. Students will be limited to one Graduate Specialization designation for their MKin degree. ○ All MKin Graduate Specializations consist of a minimum of 4 graduate level courses (worth a minimum of 2.0 credits) and this set is comprised of a mix of required and elective courses. Required 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. ○ For any of the Graduate Specializations below, an equivalent course focused on the Graduate Specialization may replace a required or elective course, with the approval of the Department Graduate Officer. ○ The requirements for each of the Graduate Specializations are described below. ○ 1. Graduate Specialization in Human Factors and Ergonomics

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
	○ To receive the Graduate Specialization in Human Factors and Ergonomics, students must successfully complete 6 required courses (worth a total of 2.5 credits): ▪ Required course(s): ▪ KIN 620 – Physical Ergonomics (0.5) ▪ KIN 623 – Organizational Ergonomics (0.5) ▪ KIN 622 – Professional Practice in HFE (0.25) ▪ KIN 622L – Professional Practice in HFE Lab (0.25) ▪ KIN 621 – Design, Modeling & Simulation in HFE (0.5 credit) ▪ KIN 686 – Human Computer Interaction (0.5 credit) ○ 2. Graduate Specialization in Movement and Exercise Sciences ○ To receive the Graduate Specialization in Movement and Exercise Sciences, students must successfully complete 3 required course(s) and 1 elective course(s) (worth a total of 2.0 credits): ▪ Required courses: ▪ KIN 655 Theory and Practice of Movement Assessment (0.5) ▪ KIN 691 Theory and Practice of Cardiorespiratory Assessment (0.5) ▪ KIN 693 Theory and Practice of Exercise Programming (0.5) ▪ Elective course 1 (choose 1 from the following list): ▪ KIN 605 Nutrition and Exercise in Health and Performance ▪ KIN 658 Physical Activity and Cognition (0.5) ▪ KIN 688 Selected Topics in Kinesiology (0.5)

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

	• **Master's Seminar**
	  ○ Students are required to complete a series of academic and discipline-specific seminars throughout their program of study.
	
	• **Graduate Studies Practicum**
	  ○ Complete the Graduate Studies Practicum milestone.
	  ○ The practicum requirement is met with a one-term, full-time, program-relevant internship/experiential placement (minimum of 420 hours) to be arranged by the student in consultation with the Department Graduate Committee. The placement, objectives, and work required to meet these objectives are to be approved by the Department Graduate Committee and the placement supervisor.
	  ○ To receive the Graduate Specialization in Human Factors and Ergonomics, students must successfully complete their practicum in a domain related to human factors and/or ergonomics.
	  ○ To receive the Graduate Specialization in Movement and Exercise Sciences, students must successfully complete their practicum in a domain related to movement and/or exercise sciences.
	  ○ Submit a discussion paper or case series related to the internship/experiential placement to the Department Graduate Committee.
	
	• **Graduate Studies Colloquium**
	  ○ Complete the Graduate Studies Colloquium milestone.
	  ○ Integrate the training they received through their coursework and experiential practicum, and discuss in a seminar setting how this could be applied to a health or kinesiology-related issue.
	
	• **Other requirements**
	  ○ Meet with the Department Graduate Committee periodically to discuss course selection and program progress.

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

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

Students currently registered in the MKin program will be able to obtain one of the Graduate Specialization designations if they fulfill the applicable degree requirements.

Department/School approval date (mm/dd/yy): 11/30/22

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

Faculty approval date (mm/dd/yy):

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

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

Towards a Proposed Vision: Graduate Studies at Waterloo

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

Winter 2023

UNIVERSITY OF WATERLOO

VISION FOR GRADUATE STUDIES AT WATERLOO

Discussion Questions for SGRC

1. Do the vision and the pathways articulated resonate with you in your administrative role?
2. The vision document asks our colleagues in the Faculties to consider changes (increases) to enrollments in graduate programs. How can the graduate and research communities work collaboratively to address the challenges identified to achieving this goal?
3. If the University realizes its vision to have interdisciplinarity as an academic differentiator, what roles will your unit play in supporting interdisciplinarity – academically, professionally and in the development of community of scholars on campus?
4. Noting that our graduate students play various roles on campus – as learners, researchers, and employees – in which capacities does your unit interact with graduate students? Are there "customer service" like standards that your unit has adopted to ensure high quality, positive interactions with graduate students?

UNIVERSITY OF WATERLOO

VISION FOR GRADUATE STUDIES AT WATERLOO

Discussion Questions for Info Group

5. The graduate community recognizes the contributions of our graduate students to the University's research mission. The vision document identifies a gap in the University's ability to measure, document, and celebrate these contributions. The vision seeks to record the impact of our graduate students' work which will differ across disciplines and units. Is there a role for your unit to play in quantifying and communicating graduate students' contributions and impacts in research?
6. The vision document suggests that pre-professional training and support for our graduates can be a strong student attractor, and a way in which our alumni remain more connected to the University. In your unit, are there efforts to support graduate students' preparation for and transition to their post-graduation activities? How strong is your unit's connection to our alumni and do these connections contribute to the strength and attraction of Waterloo's graduate programs?

UNIVERSITY OF WATERLOO

University of Waterloo Research Data Management Institutional Strategy & Implementation Plan

January 27, 2023

Contents

Vision

Data management amplifying research excellence.

Purposes

The purposes of this Research Data Management (RDM) Institutional Strategy are to:

1. Support research excellence among Waterloo researchers
2. Create a foundation for building great RDM services and tools for Waterloo researchers
3. Meet the requirements of diverse funders and publishers of research, including the Tri-Agencies
4. Reflect our commitment to RDM
5. Recognize the value of research data both to the University and to broader society – research data are a critical research output which will catalyze future knowledge and innovation

Definitions and Scope

Research Data is a component of research--increasingly so within the last decade, for a growing number of disciplines**.** Research Data refers to any information created or collected as evidence in the research process or commonly accepted in the research community as necessary to validate results and conclusions.[1] **Data Management** refers to the storage, access and preservation of data produced from a given investigation. Data management practices cover the entire lifecycle of the data, from planning the investigation to conducting it, and from backing up data as it is created and used to long-term preservation of data deliverables after the research investigation has concluded.[2]

The Tri-Agencies believe that research data collected through the use of public funds should be responsibly and securely managed and be—*where ethical, legal, and commercial obligations allow*—available for reuse by others. To this end, the agencies support the FAIR (Findable, Accessible, Interoperable, and Reusable) guiding principles for research data management and stewardship, when appropriate. While one of the purposes of this Strategy is to meet the requirements of the Tri-Agencies or other funders, it is relevant to *all* research utilizing and

[1] https://codata.org/initiatives/data-science-and-stewardship/rdm-terminology-wg/rdm-terminology/
[2] https://codata.org/initiatives/data-science-and-stewardship/rdm-terminology-wg/rdm-terminology/

producing research data in *all* forms (including, but not limited to, digital, analogue, paper, and physical materials)—whether funded or unfunded, published or unpublished, open[3] or restricted.

For the purposes of this Strategy, we consider anyone engaged in research activities to be a "researcher," including faculty, staff, and students. "We," in the Principles stated below, refers to the broader University of Waterloo research community. Research Data Management (RDM) works through the complex interplay of faculty members, staff, students, postdoctoral fellows, and the university administration. All of us need to work together to achieve our shared strategic vision.

Indigenous Data Sovereignty

In September 2022, the University of Waterloo made a public commitment to decolonization, Indigenization, and reconciliation through a formal ceremony.[4] The University officially recognized our responsibility to develop a better understanding of the history of the land we occupy, the colonial systems we uphold and benefit from, and the need to take meaningful actions to advance reconciliation, decolonization, and Indigenization across all faculties, service units, and areas of work. As a research-intensive institution, we understand the importance of applying these lenses to our research and research administration practices, including research data management.

The University of Waterloo respects and recognizes the sovereignty of Indigenous Peoples and communities over research data produced by, with, for, and about them. This includes sovereignty over the collection, use, control, access, possession, and sharing of these data. Waterloo acknowledges the Tri-Agency Research Data Management Policy statement regarding a distinctions-based approach to Indigenous Data Sovereignty:

> *"In line with the concept of Indigenous self-determination and in an effort to support Indigenous communities to conduct research and partner with the broader research community, the agencies recognize that data related to research by and with the First Nations, Métis, or Inuit whose traditional and ancestral territories are in Canada must be managed in accordance with data management principles developed and approved by these communities, and on the basis of free, prior, and informed consent."*[5]

[3] Open Data are defined as "Structured data that are accessible, machine-readable, usable, intelligible, and freely shared. Open data can be freely used, re-used, built on, and redistributed by anyone – subject only, at most, to the requirement to attribute and sharealike." See: https://codata.org/initiatives/data-science-and-stewardship/rdm-terminology-wg/rdm-terminology/

[4] https://uwaterloo.ca/news/indigenous-commitment-ceremony-signals-new-beginnings

[5] https://science.gc.ca/site/science/en/interagency-research-funding/policies-and-guidelines/research-data-management/tri-agency-research-data-management-policy

Understanding that each Indigenous community will have different requirements regarding research data generated through partnerships, we honour different models of data management, such as the First Nations Information Governance Centre's OCAP® Principles,[6] the USAI Research Framework[7] developed by the Ontario Federation of Indigenous Friendship Centres, the Global Indigenous Data Alliance's CARE Principles,[8] and the Inuit Tapiriit Kanatami National Inuit Strategy on Research.[9]

As we implement this Research Data Management Institutional Strategy, we will work with the Indigenous community on campus and our community partners to ensure that we co-develop RDM services and systems that support and respect Indigenous Data Sovereignty. We acknowledge that this may require creating distinct services for the management of research data from and relating to Indigenous communities and individuals.

Specific areas of institutional support for RDM with regards to Indigenous Data Sovereignty are described under the relevant strategic directions.[10, 11]

Governance

This document was created by the Research Data Management Institutional Strategy Working Group and is governed by the Vice-President, Research & International (VPRI), the University Librarian, and the Chief Information Officer.

This is a living document, intended to shape our activities over the next 3-5 years, but the implementation roadmap will change as priorities emerge. This Strategy will be reviewed regularly and updated for continued relevance as we assess our RDM services for maturity.[12]

[6] https://fnigc.ca/ocap-training/
[7] https://ofifc.org/wp-content/uploads/2020/03/USAI-Research-Framework-Second-Edition.pdf
[8] https://www.gida-global.org/care
[9] https://www.itk.ca/national-strategy-on-research-launched/
[10] See "Goal: Promote and Support Indigenous initiatives and a culture of equity, diversity, inclusion, and anti-racism," *University of Waterloo Strategic Plan: Connecting Imagination with Impact (2020-2025)*: https://uwaterloo.ca/strategic-plan/
[11] See "Goal: Fully implement equity, diversity, and inclusivity across the research enterprise," *University of Waterloo Research Strategic Plan: Our Connected World (2020-2025)*. https://uwaterloo.ca/research-strategic-plan/ –
[12] Using tools such as the Maturity Assessment Model in Canada (MAMIC): https://doi.org/10.5281/zenodo.5745492

Principles

1. **Collaboration**
   a. We recognize that RDM is a whole-institution effort that will require deep collaboration and coordination between the researchers, Faculties, Library, IST, Office of Research, Centres, and Institutes.
   b. We will leverage existing expertise and infrastructure around the University, as well as regionally, nationally, and internationally.
2. **Respect for Diversity**
   a. We will respect and serve the diversity of research and disciplinary practices, recognizing that there is no one-size-fits-all approach to RDM.
   b. We will provide equitable access to core RDM tools and support across all faculties and disciplines.
3. **Reciprocity**
   a. We will recognize that research data and research require ongoing relationships with various communities and ecosystems, and ongoing communication, respect, and collaboration.
   b. We will involve Indigenous researchers in the creation of policies, processes, and services to ensure that the specific needs of Indigenous Data Sovereignty are met.
4. **Ease**
   a. We will make it easy for researchers to adopt RDM best practices.
   b. We will make it easy for researchers to identify and access the most appropriate and secure infrastructure for their specific research needs.
5. **Integrity**
   a. We will respect ownership and sovereignty of data.
   b. We will align our resources with our stated values and our broader social and governmental obligations.
   c. We will acknowledge and encourage the development of processes to reward the time and expertise of all who contribute to and enable RDM excellence.
6. **Commitment**
   a. We will actively invest in RDM services, skills, and infrastructure to reflect the University's commitment.
   b. We will encourage and support all activities required for Waterloo researchers to ensure that their research data are findable, accessible, interoperable, and reusable in the long term.
   c. We will take an approach of continuous improvement, assessing researchers' and institutional needs regularly, and adjusting services as needed.
   d. We will adopt best-in-class processes and technologies to support RDM at Waterloo.

Strategic Directions, Objectives, and Goals

1. Strategic Direction: Coordinate Services

Strategic Objectives:

a. Formalize, fund, and coordinate (existing centralized and decentralized) University of Waterloo RDM services and resources under strong and visible leadership, in a way that allows for local knowledge and specialization in the faculties.
b. Ensure alignment of RDM services and processes with existing and emerging research policies, and Indigenous RDM data principles when appropriate.
c. Collaboratively design and refine services that best meet diverse research data needs, before, during, and after research.

2. Strategic Direction: Incentivize

Strategic Objectives:

a. Formally and informally incentivize RDM best practice among Waterloo researchers, especially focusing where no incentives exist (pre-research and post-research).
b. Align and coordinate RDM incentives with existing University and Faculty incentive models.

3. Strategic Direction: Expand Knowledge

Strategic Objectives:

a. Build an RDM culture of excellence.
b. Increase RDM skills and knowledge across campus for researchers and staff.

4. Strategic Direction: Promote

Strategic Objectives:

a. Promote the benefits of RDM best practices.
b. Communicate RDM resources and tools to the Waterloo community at all points in their research journey and through multiple existing channels (e.g. University-, Faculty-, Department-, Institute-, Project-level).

5. Strategic Direction: Invest in Expertise

Strategic Objectives:

a. Invest in strong and visible RDM leadership.
b. Invest in the human infrastructure to support and scale RDM services.

6. Strategic Direction: Invest in Technical Infrastructure

Strategic Objectives:

a. Define local technical infrastructural needs vis-à-vis regional and national infrastructure.
b. Invest in scaling and making it easy for researchers to use secure, University-managed infrastructure, meeting levels of need ranging from small to very large datasets.
c. Integrate with other campus IT initiatives including the IT Governance review, the Research Computing Committee work, and research security.
d. Promote and/or expand existing RDM preservation services.

Implementation Plan

STRATEGIC DIRECTION 1: Coordinate Services		
Strategic Objective 1a: Formalize, fund, and coordinate (existing centralized and decentralized) University of Waterloo RDM services and resources under strong and visible leadership, in a way that allows for local knowledge and specialization in the faculties.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Model approaches to coordination of services, including ongoing governance, and choose a model	Spring 2023	RDM WG[13]
ii. Establish project management team and project governance structure to coordinate strategic RDM projects	Fall 2023	RDM WG
iii. Develop a project status communication plan	Spring 2023	RDM WG
iv. Define "core" RDM services available to all researchers	Fall 2023	Library
v. Integrate RDM services and communications into existing university-level onboarding and research project processes	Fall 2024	Office of Research
Strategic Objective 1b: Ensure alignment of RDM services and processes with existing and emerging research policies, and Indigenous data principles when appropriate.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**

[13] The Research Data Management Working Group is envisioned as the placeholder for now. A coordination approach may involve the creation of a different standing, coordinating body.

i. Review existing research policies, procedures, and guidelines for consistency	Spring 2023	Office of Research
Strategic Objective 1c: Collaboratively design and refine services that best meet diverse research data needs, before, during, and after research.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Identify existing challenges to accessing RDM services	Spring 2023	RDM WG
ii. Inventory available RDM services at Waterloo and beyond, taking advantage of regional, national, and international infrastructure and resources where available.	Spring 2023	RDM WG
iii. Amplify existing RDM services	Fall 2023	Library
iv. Identify and prioritize service gaps, including by faculty and/or discipline	Winter 2024	RDM WG
v. Create an RDM portal that will serve as a central place to find all RDM resources	Fall 2023	IST
STRATEGIC DIRECTION 2: Incentivize		
Strategic Objective 2a: Formally and informally incentivize RDM best practice among Waterloo researchers, especially focusing where no incentives exist (pre-research and post-research).		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Develop an Excellence in RDM Award	Fall 2024	Office of Research

Strategic Objective 2b: Align and coordinate RDM incentives with existing University and Faculty incentive model.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Develop and provide exemplar language for Departments, Schools, and Faculties to consider when evaluating faculty research activity	Fall 2023	Office of Research
STRATEGIC DIRECTION 3: Expand Knowledge		
Strategic Objective 3a: Build an RDM culture of excellence.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Provide examples to researchers of how RDM eases their research process, promotes greater data accessibility, and supports research excellence	Winter 2024	Library
ii. Foster communities of practice	Fall 2023	RDM WG
Strategic Objective 3b: Increase RDM skills and knowledge across campus for researchers and staff.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Fund additional RDM professional development for existing RDM and IT staff	Ongoing	Library/IST
ii. Advocate for RDM training for students in research streams	Fall 2023	GSPA
iii. Provide baseline RDM training for research teams	Ongoing	Library

iv. Develop curriculum and provide ongoing training around Indigenous RDM Data Sovereignty principles	Fall 2023	Office of Research
STRATEGIC DIRECTION 4: Promote		
Strategic Objective 4a: Promote the benefits of RDM best practices.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Identify a pool of exemplar researchers interested in, and practicing RDM.	Spring 2023	Office of Research
ii. Develop UW Case Studies that illustrate the benefits of RDM best practices for research outcomes, replicability, and dissemination	Winter 2024	RDM WG
iii. Create "RDM Champions" - researchers who can speak to how RDM contributes to research excellence	Winter 2024	Office of Research
Strategic Objective 4b: Communicate RDM resources and tools to the Waterloo community at all points in their research journey and through multiple existing channels (e.g. University-, Faculty-, Department-, Institute-, Project-level).		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Develop use cases, research workflow guides, checklists, and decision trees for researchers' self-guided RDM	Fall 2023	Library
ii. Align services and human contacts with different points in the decision tree, making it easy to find the right people at the right time	Fall 2024	RDM WG

iii. Establish a responsive communications plan to keep researchers informed of changes and opportunities in the RDM landscape	Fall 2024	RDM WG
iv. Identify and close service awareness gaps	Fall 2024	RDM WG
STRATEGIC DIRECTION 5: Invest in Expertise		
Strategic Objective 5a. Invest in strong and visible RDM leadership		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Define and recruit an interim RDM coordinator	Spring 2023	Library (dotted line to Office of Research)
ii. Define and recruit a permanent RDM coordinator	Spring 2025	TBD
Strategic Objective 5b. Invest in the human infrastructure to support and scale RDM services.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Assign dedicated resources to manage RDM projects	Ongoing	TBD, based on specific projects
ii. Define the key competencies of project and portfolio management capabilities to ensure successful delivery and management of services	Winter 2024	RDM WG (as location of services TBD)
iii. Fund additional FTE with appropriate RDM expertise in ways that provide equitable access to researchers from across the Faculties.	TBD (based on capacity needs)	RDM WG (as location of services TBD)

iv. Make consultative support available: 1. at earliest stages of project development to plan for best practices in data stewardship 2. at beginning of active research to enable best practices in data collection and processing stages 3. at end of projects, to enable best practices in appropriate data destruction, preservation and/or sharing	Fall 2023	Office of Research
iv. Improve the ease of use and access of centralized RDM services	Fall 2024	RDM WG
STRATEGIC DIRECTION 6: Invest in Technical Infrastructure		
Strategic Objective 6a. Define local technical infrastructural needs vis-à-vis regional and national infrastructure.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Identify and understand the technical services available to researchers from our regional and national partnerships	Fall 2023	Library
ii. Collaborate with Indigenous researchers to identify access to and/or design reliable and trustworthy community/local infrastructure that meets Indigenous communities' data sovereignty needs and standards	Winter 2024	Office of Research
Strategic Objective 6b. Invest in scaling and making it easy for researchers to use secure, University-managed infrastructure, meeting levels of need ranging from small to very large datasets.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**

i. Design all services and technical infrastructure informed by user research	Ongoing	RDM WG
ii. Improve the ease of use and access to active storage and sensitive data storage	Fall 2023	IST [CTSC]
iii. Improve the ease of use and access to collaboration tools	Fall 2023	IST [CTSC]
Strategic Objective 6c. Integrate with other campus IT initiatives including the IT Governance review, the Research Computing Committee work, and research security.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Advocate for appropriate membership on campus committees	Spring 2023	Office of Research
Strategic Objective 6d. Promote and/or expand existing RDM preservation services.		
Goal	**Estimated Project Start Date (Academic Term)**	**Lead Unit**
i. Assess current state of preservation options	Spring 2023	Library
ii. Collaborate with national research data preservation initiatives.	Spring 2023	Library